

MODERN PLASTICS

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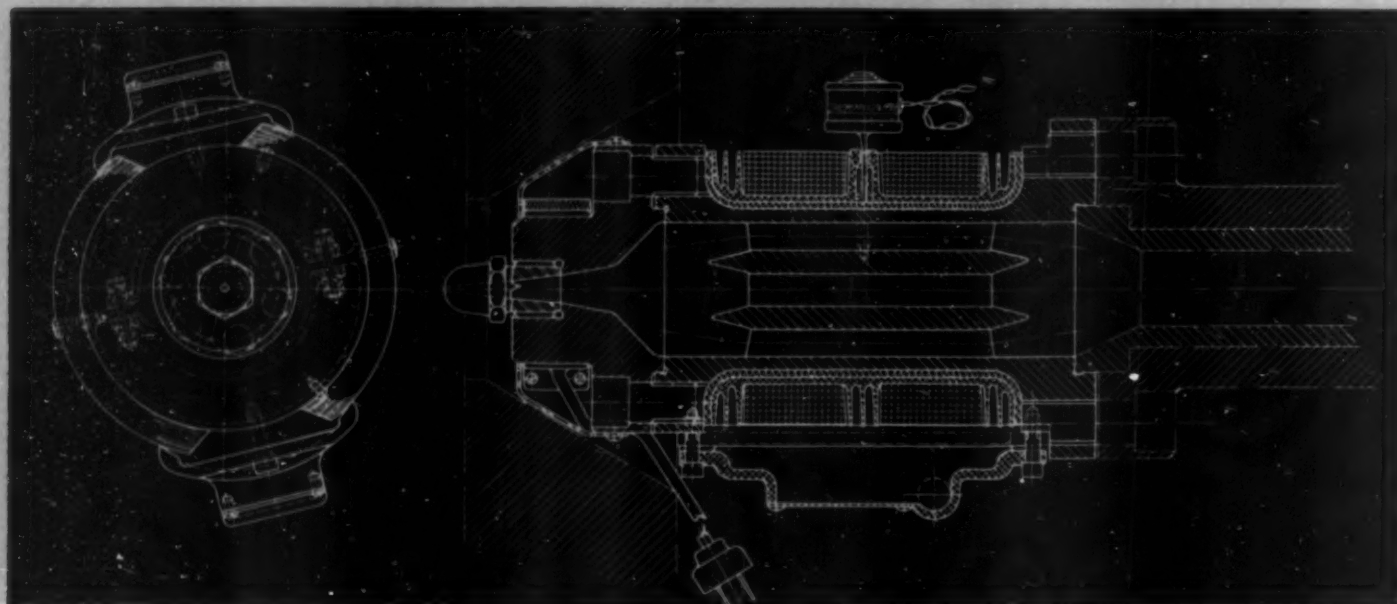
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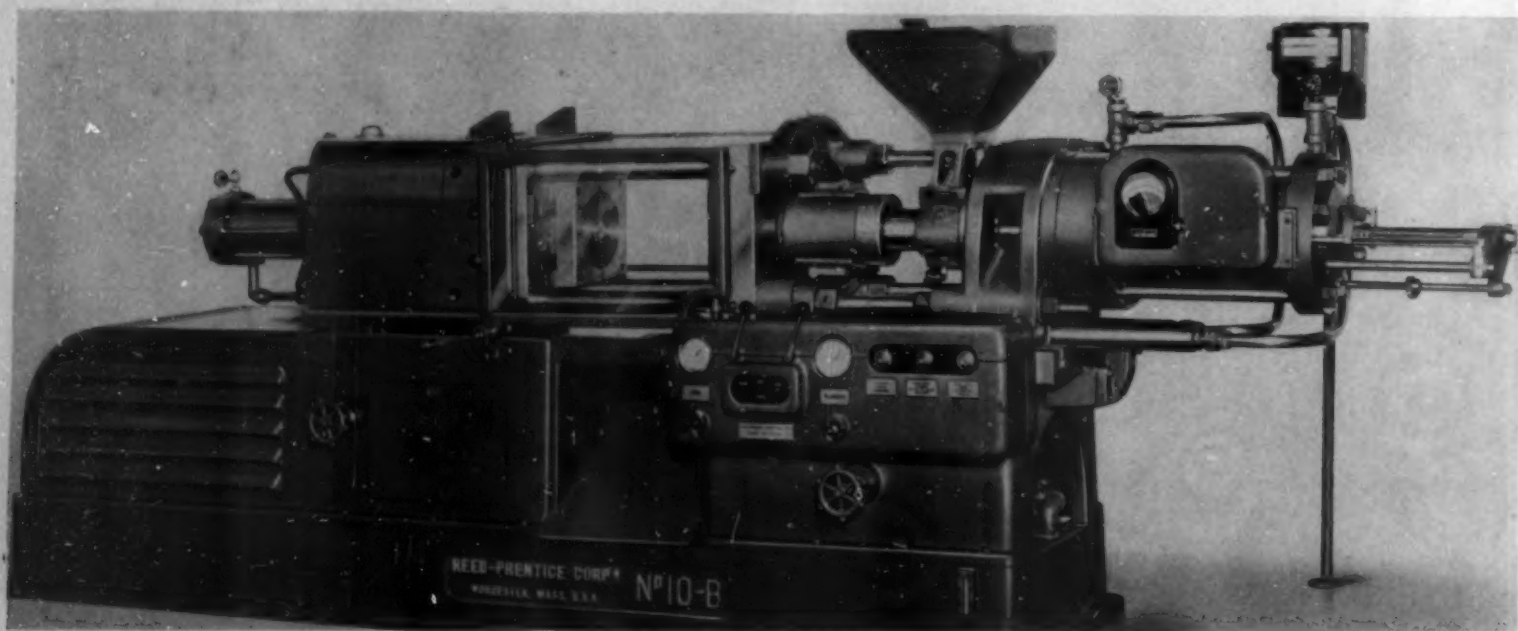


What with new injection molding presses popping up almost every month, chemists in the huddle about new thermoplastics, larger and larger parts being talked about and occasionally produced, we are fortunate to have L. T. Barnette of Thermo-Plastics, Inc., tell in our August issue some of the experiences and plans of this company which has pioneered the multi-cylinder, T-type press capable of automatically injecting a steering wheel over a metal core, one every 45 seconds.

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TWENTIETH CENTURY LIMITED

As told to your reporter by Henry Dreyfuss

IT IS UNFORTUNATE, PERHAPS, FROM THE passenger's point of view that railway coaches and Pullman trains last so long. They become so outmoded before they have justified their cost that progress in comfort and convenience leaves them far behind. If automobiles were blessed with anywhere near the length of life of a good Pullman train, many of us would still be bouncing along in a Buckboard model made about 1911. Contrast, however, becomes more acute when a new train makes its appearance and we are amazed at the progress in design and engineering revealed by the comparison.

The New York Central System put into service the middle of last month a fleet of four streamlined trains

which constitute the Twentieth Century Limited, operating daily between New York and Chicago. The 62 cars and 10 streamlined locomotives, constructed especially for these trains, set new standards of comfort, convenience and luxury in transportation. Scheduled running time between the two terminals is sixteen hours.

As the Century flashes along, at 60 to 80 miles per hour, it appears like a sleek, gray, metallic tube on wheels, the vestibules melding into each other, with the steps folding up out of sight. Its sinuous exterior unity is emphasized by an uninterrupted smooth surface and by a dark gray band edged with blue and with two silver stripes in the center, which runs from the locomotive



DRIX DURYEA PHOTOS

Curved settees and a varied arrangement of tables break the traditional, long, narrow aisle in the dining cars and provide intimate seating for parties of from one to five



End dining rooms which are small and cozy, are divided from the main sections by partitions of transparent Plexiglas. They have walnut walls, rust colored ceilings, gray leather chairs

tender to the end of the last car, in the window area. Further enhancing its streamlined appearance are skirts curving below the car bodies, which conceal the lighting, heating and air-conditioning machinery.

The three types of public cars—lounge, observation and dining cars—are all of new and unusual plans created by Henry Dreyfuss, one of America's foremost industrial designers, in cooperation with the N. Y. C. Equipment Engineering Department, and the Car Builder and Lighting Fixture Manufacturers. Sleeping cars, which are all of new Pullman design, but with no open berths, every passenger having a private room, enjoy the colors and materials selected by Mr. Dreyfuss to make the whole train a harmonious unit. As a result, there is evident throughout the train a restful feeling of spaciousness, of luxury, and tempting comfort. Every car and every room is air-conditioned, enabling passengers to enjoy "man-made weather" the year around. Even when the train is standing in terminals the air-conditioning apparatus will operate.

Speaking of the interiors, Mr. Dreyfuss said, "I think that first of all, our big attempt has been to make the new streamlined 20th Century Limited as luxurious and dignified as we could. We wanted to give both comfort and speed without either being obvious, and we think we have achieved both. So many of the high speed trains have sacrificed comfort to gain speed by being light weight and doing with as little decoration as possible.



DRIX DURYEA PHOTOS

The lounge car provides an innovation in informal seating. Settees are made in interlocking shapes so that small groups of people may sit together. Tables and desk have Formica tops

"The Century is used so much by business men who are usually tired when they climb aboard that we wanted to make the interior as restful as we could. It isn't gay looking but has dignity. The cars have the feeling of the *Waldorf* or *Queen Mary* interiors without being overdone in any way. But unlike rooms in a hotel or an ocean liner, the cars are a definite set size and nothing much can be done about that. The train must be made up of a lot of separate units and the designer, of course, doesn't know how these units are going to be joined together. We tried to arrange color and decoration so that no matter how the units are put together, there will always be the feeling of one unit rather than a lot of cars assembled hit-or-miss fashion."

Although each train is made up usually of at least 13 units, with varying plans, furnishings and decorations for each, a simple color scheme ties it together. From locomotive to observation car, the exterior is in two tones of gray, with blue and silver stripes. Throughout the interior, rust, blue, tan and gray are used in several tones and in appealing textures and finishes, complemented by the natural colors of woods, metals, leathers and plastics.

"In the lounge car," said Dreyfuss, "we have an entirely new development in informal seating in a train, replacing the usual straight lines of tables and chairs." Settees are made in interlocking shapes so that small groups of people may sit to- (Please turn to page 62)



The service bar in each lounge has back shelves of Plexiglas cut in strange shapes, recessed so that glasses can't slide as the train moves. Bar top and tables have Formica tops



Fashion has dictated extraordinary changes in the design of spectacles recently. These frames of du Pont Pyralin by Optical Products Co. indicate the most recent trends in convenience, comfort and use of color

TO SEE OR NOT TO SEE

is a matter of optical correction. Comfort and smart appearance is a matter of choice in optical frames

OPTICAL CORRECTION OF ONE SORT OR ANOTHER is required by most persons who use their eyes a great deal but there is no reason why spectacles should be uncomfortable or disagreeable to wear. Properly chosen and fitted, they lend eloquent expression to all types of faces. They are capable of individual expression that is both *chic* and *distingué*. This is particularly true of zylonite spectacles which, because of their flexible, hand-made characteristics that distinguish them from other spectacles, are practically "made on the face."

Zylonite is a generic term applied to a cellulose nitrate plastic developed for the optical industry some thirty years ago, originally in "tortoise shell," or dark mottled

design. It is tough, flexible and durable beyond comparison with almost any other material. It lends itself especially to the extensive process necessary to complete a handsome optical frame and since expensive molds are not essential to its fabrication, styles may be changed, new designs introduced at will. Its origin is from cotton linters, nitric acid and camphor which pass through a long series of carefully controlled chemical steps to achieve the finished plastic. But the finished plastic is only the starting point for the manufacture of frames.

Procedure in different manufacturing plants varies with individual equipment and requirements, but generally speaking, zylonite frames are largely fashioned by

hand. Unlike injection molded sun glasses which are turned out in huge quantities of identical shapes, they are capable of more individual design, better finish, more permanent shape.

Zylonite arrives at the manufacturer's plant in large sheets which are cut into strips about 20 in. by 5 in. which serve as the actual working units from which each frame is made. The pattern of a particular frame design is carefully marked on one of the strips, which is in turn used as a marker for four other such strips, each separated by oil paper and nailed together. All five strips are then jig-sawed at the same time following the design marked on the top strip. When the unit of five strips is cut to pattern, they are separated and each cut-out is washed in cold water and dried in clean, fine sawdust.

The plastic blank is then submitted to a turning operation which cuts the two eye cavities to exact size and shape, after which comes the hand shaping operation. The front is evenly heated by electricity and the bridge is bent into shape by hand pressure applied against the sides of the frames. Various bridge sizes are gaged by strict conformance to exact steel bridge models. The frame is then passed to the next operation where the groove is inserted which will eventually hold the lenses tightly in place. By means of a hand-guided lathe, this groove is turned with hairline accuracy.

After these operations the frame is passed on to three combined processes of sandpapering, fraizing and carving. Every bit of the front is gone over to form it into its attractive, well-shaped structure. Holes are carefully punched and slots cut out in the end pieces to prepare them for the attachment of *(Please turn to page 66)*

Above at the right, some of the steps in optical frame production are pictured. From the blank, front, cut-out and temples, these Pyralin spectacles are fashioned by Optical Products Co. Below at right: May Manufacturing Co. shows some of the new frames (open and closed) which fold into practically nothing at all for carrying. Directly below: Two new flesh color Pyralin frames with thin temples. One with white metal bridge. (Courtesy du Pont)





Molded table tops, chair backs and arms, are popular in France where outdoor refreshment terraces provide weather conditions that are difficult for other materials to meet

MOLDED FURNITURE FROM FRANCE

The New York World's Fair and the Golden Gate Exposition could use a lot of these

BECAUSE THEY COULD SET ALL DAY IN THE blistering sun without damage, and withstand damp and rainy weather as well, most of the tables and chairs used at the Paris Exposition last year, were made of plastics instead of wood. They were also used in indoor bars because of their resistance to beverages and they are easy to clean.

As a matter of fact, thousands of these tables and chairs have been used for several years in the Paris cafes and restaurants. The round tables are used principally on outdoor terraces, where space is at a premium and they stay outdoors summer and winter in the sunshine and rain, and because they are molded of high grade phenolic molding powder, they wear and weather well.

They are produced in many colors, plain or mottled. But, because they are phenolic, they are largely confined

to black, brown, red and dark green. Reinforcing ribs provide extra strength and support the metal inserts into which the legs are attached by threads. Those illustrated are produced by Manufacture d'Isolants et Objets Moules, and Monsieur Forrer of that company says: "They have proved far more suitable than any other type of table, because the molded tops do not become stained by water, alcohol, grease or vinegar, etc. Because they are molded, no finishing edge is required. There is no place for moisture to gather, no cracks. They have a permanent smooth finish which feels warm to the touch and their appearance is smart. They lend a rich, modern tone to any interior, especially the combination of black table tops with chromium legs and crystal tableware (*Please turn to page 65*)

HOUSING MIDGET MOTORS

by C. R. SIMMONS*

Housing projects in which plastics provide the only practical solution

THERE WERE MIDGET MOTORS BEFORE THERE were synthetic phenolic plastics—but they had no mass universal use. (We're speaking of the very smallest fractional horse-power motors used for razors, clippers, tooth-brushes, etc.) Then along came Colonel Schick and put the two together on a production basis and look what's happened. He has almost personalized this small motor because the plastics manufacturer furnished him an ideal material with which to do it.

It is often a rather easy matter to suggest a convenient shape and specify material for some article when one doesn't have to give consideration to its insides. But when such an article is to have "electrical insides" problems start popping up. Most notable of these are design, electrical properties, heat insulation, noise reduction, bearing alignment, assembly and finishing.

* General Plastics, Inc.

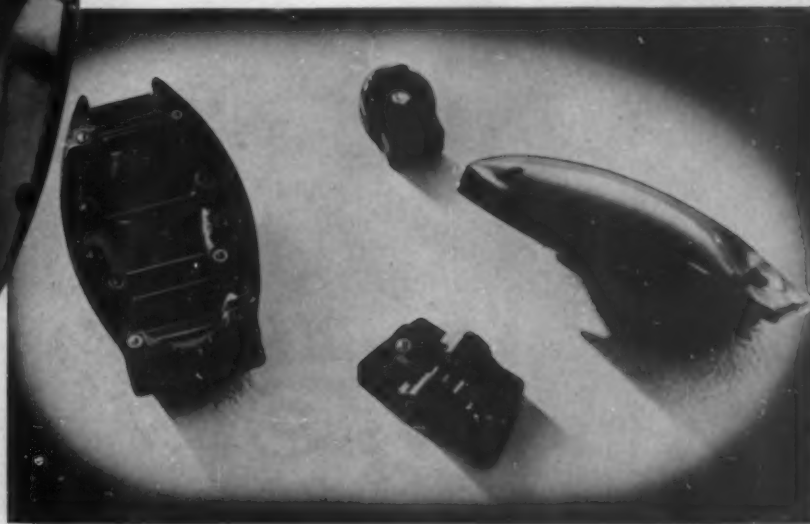
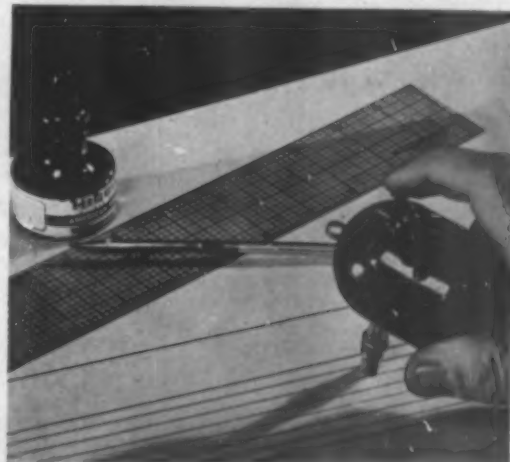
Modern plastics have licked these hazards handily when the insides are to be these smaller fractional horse-power motors. It matters not whether these motors are round, square, short or long, molding a plastics case to hold them is a comparatively simple matter. Hand-fit, streamline or tear drop design present no obstacles.

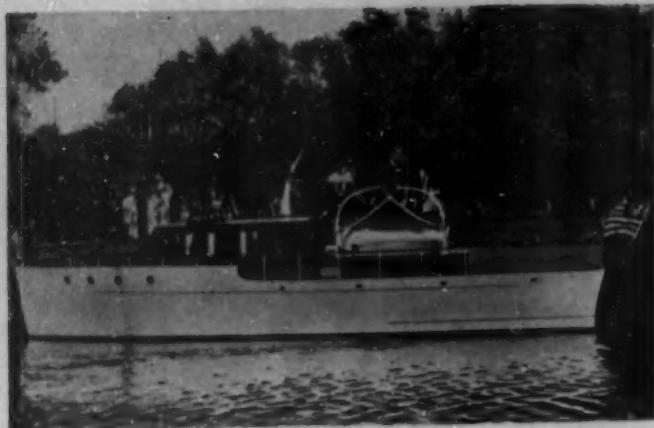
Plastics, with their excellent dielectric properties, enable the designer to pass over that angle quickly. But what about heat? These motors, small as they are, do get hot and would soon be quite uncomfortable to the human hand (or face) if it were not for the heat insulation of the plastics. It is the one material that is actually a heat insulator and has the designability and electrical characteristics necessary. No special wrapping of motors nor heat resistant liners are required.

What about noise? Home use, or should we say facial use of an article containing (Please turn to page 64)



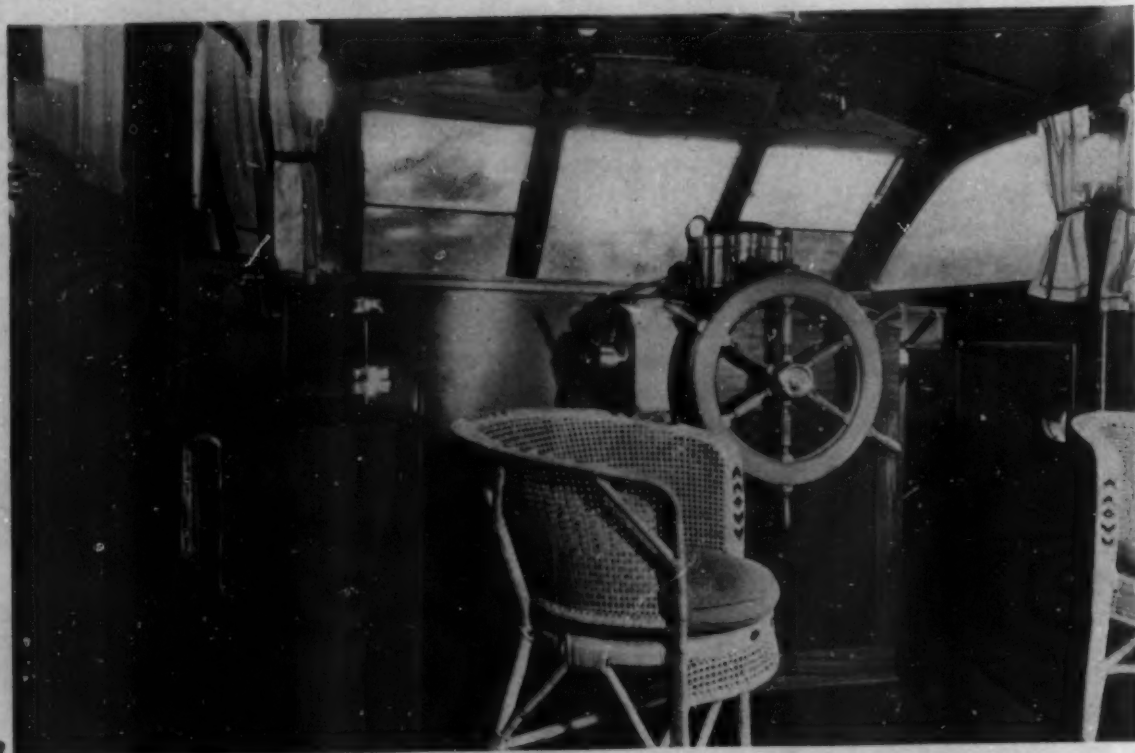
The Packard razor, at the left, requires many accurately positioned metal inserts to insure smooth operation of the tiny motor and movable parts. These are molded in place and are shown below. The Motoraser, at the right, demands similarly accurate engineering and production technique





LAMINATED INTERIORS AT SEA

by AL HAYWARD



COME JULY AND WATERFRONTS EVERYWHERE bristle with the season's crop of boats fresh from winter storage and painted, polished and scrubbed until they glisten in the sun. Ready and waiting they are for leisurely jaunts up and down the coast, slipping in and out of harbors and coves along the way, while passengers aboard relax comfortably, far from the insistent tinkle of telephones and such.

Half the fun of cruising, though, is in navigating a safe craft that can be kept shipshape without too much effort or expense. Such a boat is the "Bo'son," cabin cruiser launched last October by R. W. G. Wilson, of Cleveland. Designed for him by John L. Hacker, of Detroit, and built by A. L. Beatty, of Huron, Ohio, she is 51 ft. 3 in. long with a 12 ft. 6 in. beam. The sleek-lined teak and white exterior shelters a spick and span interior of modern furnishings against a background of modern materials.

"We used laminated plastics to decorate the entire interior (walls and ceilings)," says Mr. Wilson, "in light and dark colors and natural wood finishes. The effect is beautiful and the material has proven practical."

Laminated plastics are quite as much at home on shipboard as they are ashore, giving the same dependable protection and service, sea air or no. They never flake or peel when exposed to dampness as does paint or varnish treated wood, which looks shabby unless it is repainted or revarnished every season or two. The plastic finish will last for years with only an occasional scrubbing with soap and water to keep it tidy and fresh. Even fire can make no headway with laminated plastic materials. An open flame held against the plastic surface will scorch it, but the flame will not spread rapidly.

Because of such desirable qualities, these materials are becoming more and more popular in marine architecture and construction, for privately owned yachts like Mr. Wilson's as well as on the huge *Queen Elizabeth*, sister ship of the *Queen Mary*, now under construction.

1. (Opposite page). The "Bo'son," a trim 51 foot cabin cruiser owned by R. W. G. Wilson, Cleveland, Ohio.
2. Formica, a laminated phenolic architectural plastic lines the walls and ceiling of the Wheel House.
3. The light colored walls and ceiling in the owner's cabin are constructed of urea laminated. Light or dark colors and natural wood finishes are provided throughout the ship by this plastic material which is unaffected by moisture that is bound to reach the furniture and walls of the cabins (below) (4); and the lavatory (5). Formica also resists steam and accidental fire in the gallery (6)



PHENOLICS IN THE GRAPHIC ARTS

by HYLTON SWAN*

I HAVE BEEN ASKED TO CONTRIBUTE AN ARTICLE on the subject of "Phenolic Printing Plates." But in the light of present day developments in this field the subject would be described more correctly if captioned "Phenolic Matrices" for rubber printing plates.

The present trend in letterpress printing is all in the direction of rubber as the printing medium, for which it has many advantages. Rubber plates are easy to mold, they can be curved readily and without distortion around the press cylinder, they require less make-ready and less ink, when properly molded have exceptionally long life. But an essential prerequisite to the making of a good rubber plate is a good matrix material in which to mold them. And phenolic resinoids seem inherently to possess all the qualities necessary for this purpose.

To digress for a moment, it may be of interest here to recall the fact that way back in the early days of the phenol resin development there was a fairly substantial use of this material for printing plates. Many thousands of such plates were made and our archives still

contain interesting examples of high quality printing produced with them. But they had limitations with respect to brittleness, cost of production and most serious of all the impracticability of curving them for use on rotary presses. So they were gradually displaced by the less costly but also less effective stereotype.

Then came the call for a phenolic material for making matrices in which to mold rubber printing plates for use in the cotton and paper bag industry. If my memory serves me correctly the Bemis Bro. Bag Company of St. Louis were the first to adopt this material for this purpose early in 1915. It proved immediately successful and its use spread rapidly so that today it has become the standard matrix material used by the cotton and paper bag industry.

But from this point there was a wide gap to the acceptance of rubber printing plates by other branches of the printing craft. In seeking to extend the use of these plates to other forms of relief printing we were met by a demand for an appreciably higher quality of plate than was necessary or required in the bag trade. The type of

* Vice-president, Bakelite Corporation

From the metal master plate (left) the Bakelite Matrix (right) is molded. This matrix in turn serves as a mold for making rubber printing plates

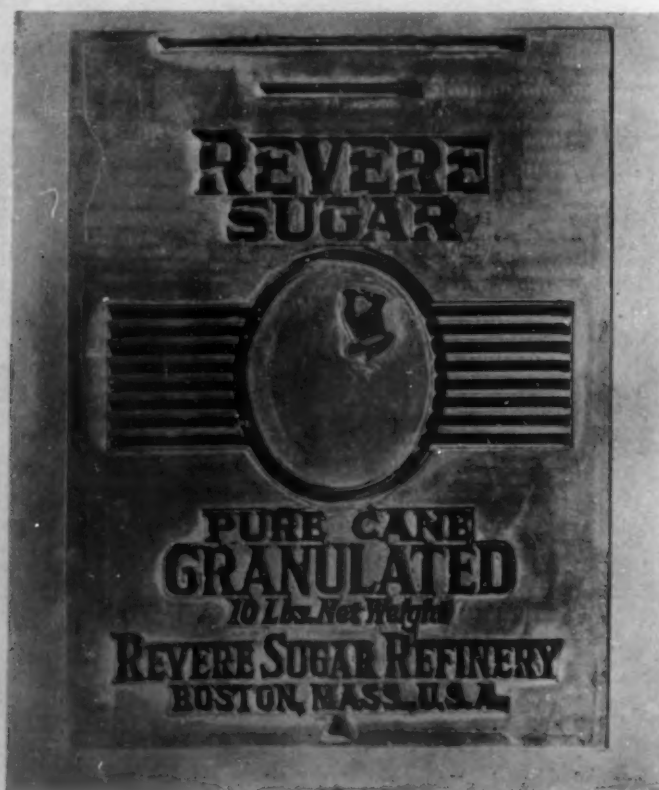


plate used in printing business forms, stationery, booklets, and the general run of letterpress printing called for a much more exacting manufacturing technique than had anywhere been used up to that time.

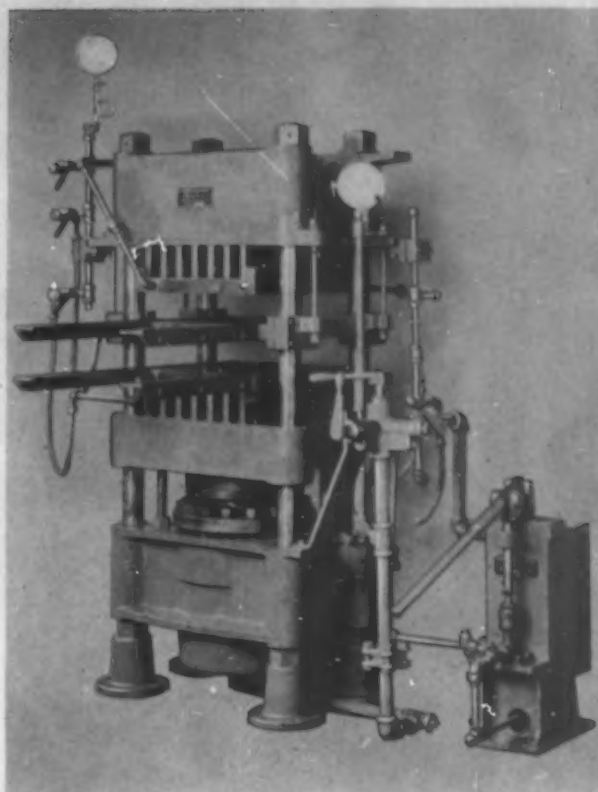
This called for improvement both in the matrix material and in the rubber. The market was an attractive one if the gap could be bridged, but the problem proved to be far from as simple as it seemed and so began a long period of research and study. The matrix material had to be redesigned to get away from the soft free-flowing plastic sheet currently being used. The salient characteristics of the new sheet had to be greater strength, less shrinkage, very limited flow, and yet be soft enough to produce readily, sharp clean type impressions and fine lines without injury to the type.

At the same time it must not be so plastic as to lock itself in the type interstices or flow down into the low space areas of the type form. And finally, it must become hard and infusible at 60 pounds steam so as to be used interchangeably in the same presses in which the rubber plates are vulcanized. Sixty pounds steam pressure is the standard for rubber plate molding.

After considerable experimentation and research a solution was ultimately arrived at which reconciled these seemingly conflicting specifications. The answer was found in the manufacture of a type of fiber board of very open structure and in which the interstices were filled with a special phenolic resinoid.

These resins are incorporated with the pulp in the beater during the making of the fiber sheet by a technique which insures the uniform distribution of a hard quick-setting resinoid throughout the sheet without the use of alcohol solvents commonly used in phenol resin paper products. The pulp serves as a skeleton or frame in which to hold the resinoid fillers. The interlocking fibrous structure of the sheet serves to restrict side flow and shrinkage while the openness of its weave permits an appreciable compression to those portions of the sheet which are subjected to pressure from the type areas when molding the matrix. This matrix sheet has proved a distinctly forward step in our work and has made it possible to produce matrices with a fine quality of line cut and type reproduction.

The equipment for matrix and plate making is quite simple and not expensive, the principal item being a good hydraulic press of the type illustrated in Fig. 1. An average size would be 24 in. by 24 in. platens, single or double opening, with a 16 in. ram. For some purposes a smaller size is used—20 in. by 20 in. platens and a 12 in. ram, although the larger press is generally preferable because of its greater capacity. The lower press platen should be guided on the four uprights so as to insure parallelism of the upper and lower platens. In many cases the presses are operated on city water pressure which will take care of about 95 percent of the stroke. The final squeeze is obtained by a hand pump attached to the press. Some presses have self-contained low and high pressure units, motor operated, with oil as the compression fluid. Either steam or electricity can be used as the heating medium. Both (*Please turn to page 68*)





1
LOUISE SANDERS

SUMMER WHIMSIES

by EVE MAIN



THE HOTTER THE SUN, THE BIGGER and trickier go hats for sports, beach and informal summer doings. Made from feather-light material, garnished with frivolous copies of nature's crawlers, hoppers and fliers, these bonnets are comfortable and fun to wear even at ninety in the shade. (1) The "Bimbo" has an adjustable transparent plastic disc cleverly attached to a band fitted around the cap-like part of the hat so that it can be slipped to the left, the right or wherever, to protect the eyes from sun. The cap part is in gay colored printed material held on by a back strap and buckle, and the plastic disc is maize, pink, green or deep rich brown to match one of the colors of the print. (2) Upon a navy blue mandarin beach hat perches a bright red lobster—bulgy eyes, business-like claws and all. A fishnet veil trails behind. (3) A pop-eyed green and yellow grasshopper munches a small sheaf of yellow wheat on a natural straw field. (4) In Tyrolean mood a high crowned yellow hat is trimmed with twin quills of black criss-crossed with tiny stripes in contrasting colors. A ribbon tie helps keep the chin up in sizzling weather. (5) Poised on a sheltering garden party hat is a black and yellow dragon fly with his eye on a fistful of white daisies. The hats mentioned in nos. 2, 4 and 5 are fashioned from transparent or translucent cellulose acetate; all ornaments are of the same material, most of them in opaque colors. (All photos courtesy du Pont)

CORA SCOVIL





VACUUM BOTTLES

Remember the vacuum bottle of a few years ago—with its nickel-plated case and caps? It kept things hot or cold, all right, but that was before the days of plastics and designers.

Today's vacuum bottle looks, feels and works better, thanks to plastic molding. Vacuum jugs and bottles have smooth, rust-proof plastic cases, nested cups and covers, and many office sets have plastic trays. The bottle shown here—a new product of Aladdin Industries, Chicago, uses plastics because of its resistance to chipping, denting and corroding—and because the molded parts are light in weight and pleasant to the touch. Tasteless, odorless ivory Plaskon is used on this Aladdin bottle.

Molded by Chicago Molded Products Corp.

PLASKON*

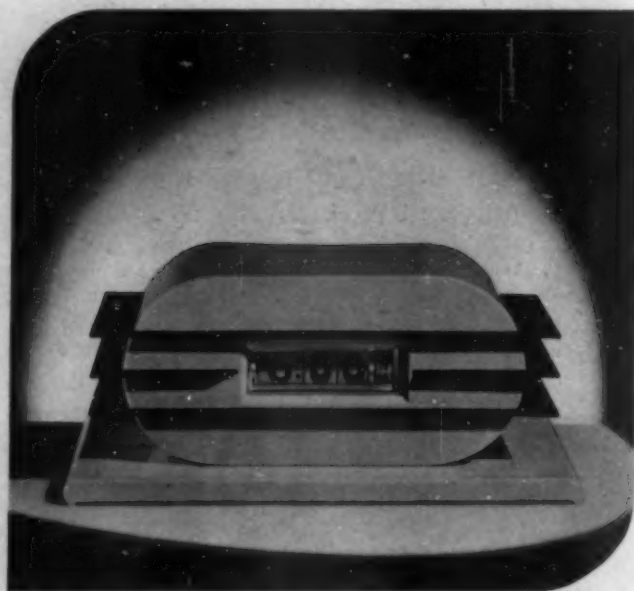
DIRECT READER

Of the several types of direct-reading clocks, Pennwood is one of the most popular. This Pittsburgh company which has rocketed to prominence in a few years, has had several molded plastic models, but this new model is the smartest and most modern design in the line. Both base and oval case are molded of Ivory Plaskon, set off by the three horizontal plates in contrasting colors and by a chromium-plated bezel.

Speaking of clock-cases, ivory Plaskon continues to be one of the most popular colors—due undoubtedly to the trend toward lighter, more airy color schemes in new and modernized homes and apartments. Ivory Plaskon harmonizes with any color scheme, whether light or dark, dull or brilliant, and has a soft, rich look that makes any product look more valuable.

Chicago Molded Products Corporation produces these unusual Pennwood clock cases.

*Trade Mark Reg. U. S. Pat. Off.



PLASKON

2121 SYLVAN AVE.
CANADIAN AGENT CANADIAN

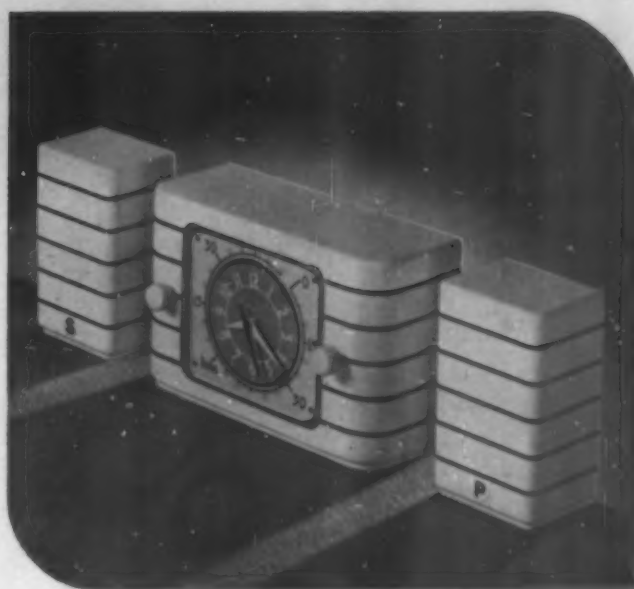
JULY - 1938

SHAKERS AND TIMERS

Making things easy for the housewife is a manufacturer's surest path to success, and modern electric ranges with their automatic timing devices certainly make things easier in the kitchen.

These timers, as you know, have been housed in all sorts of cases in the past, but more and more of them are now being molded of Plaskon. For with Plaskon, you can get, for instance, a permanent snowy white that won't be yellowed by sun or heat, won't be corroded by water or food acids, and won't be stained from grease. Hard knocks won't dent or chip it—and the decorative possibilities of Plaskon are almost unlimited.

Lux Clock Company is the manufacturer; Waterbury Button Company, the molder.



MOLDED COLOR



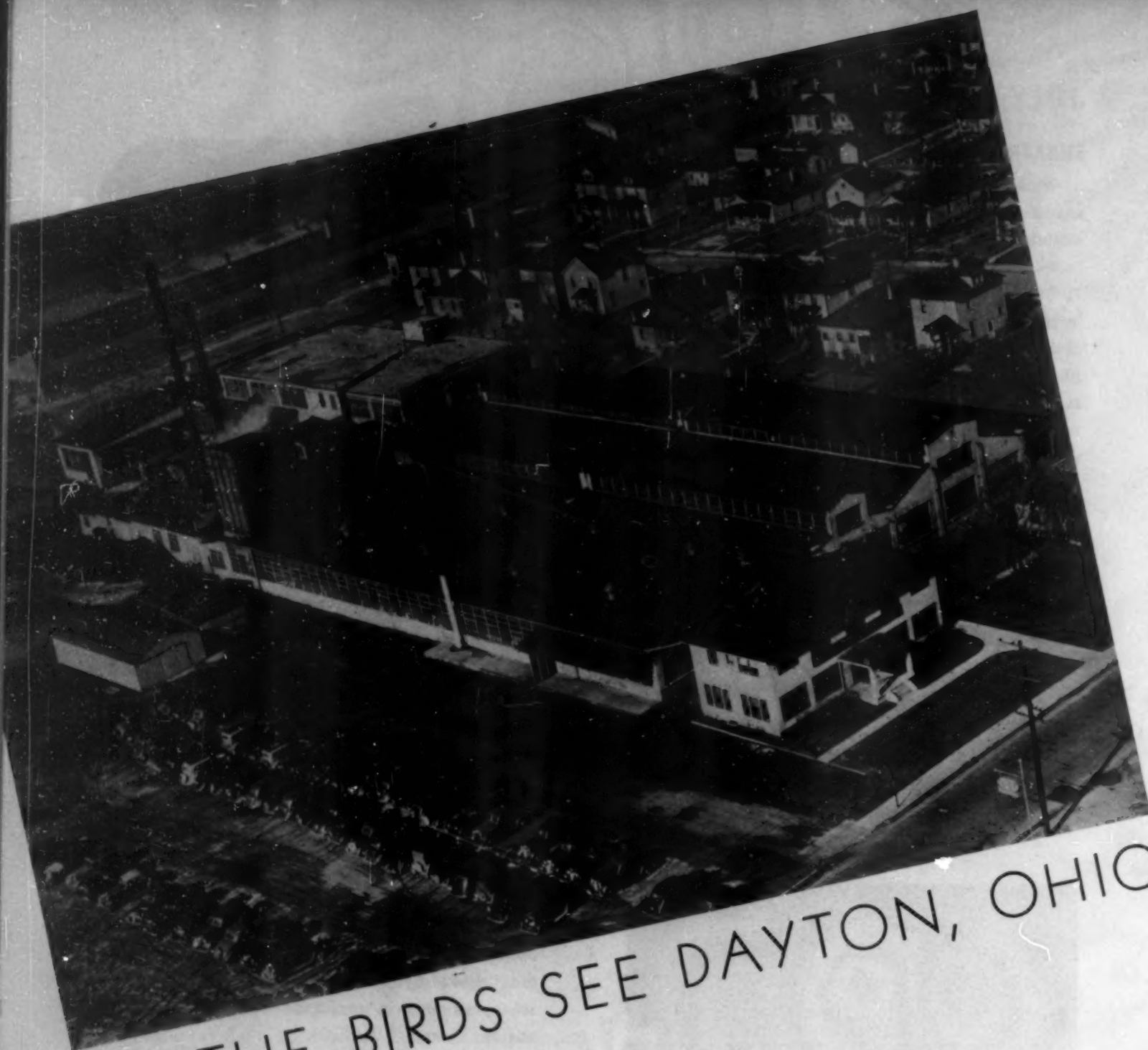
COMPANY INCORPORATED
TOLEDO, OHIO
INDUSTRIES LTD., MONTREAL, P.Q.

PLASKON SIGN

Ingenuity—and Plaskon—are producing some effective signs and displays these days. Here's one that glows mysteriously at you when you walk into your electric appliance store—yet you can't see the source of the light.

The secret is a tubular lamp hidden in the molded Plaskon base, the light from which shines up through the glass panel—brilliantly illuminating the edges and the engraved lettering by the refraction principle. The flat areas of the glass, however, do not refract the light so the contrast between lettering and background is dramatic.

Plaskon is an ideal material for sign bases and displays of almost any type, because it can take complicated shapes, can reproduce details and decoration, and often reduces difficult fabrication jobs to simple one-piece moldings. Also, it resists heat, handling, dirt, grease, and hard knocks, eliminates danger of shorts and shocks. Molded by G.E. for Neon Products, Inc., Lima, Ohio.



AS THE BIRDS SEE DAYTON, OHIO

BIRDS, OR HUMANS, FLYING OVER DAYTON, OHIO, LOOK DOWN upon this modern, efficient molding plant of Kurz-Kasch, Inc., where molded plastic electrical products are turned out for distribution to every State in the Union. Located on a four-acre plot with room for expansion, the plant provides 62,000 square feet of floor space where four hundred and fifty employees operate one hundred and fifty presses and incidental equipment. The tool-room where all Kurz-Kasch molds are made is one of the best equipped in the country, manned by sixty-two experienced mechanics and tool engineers. All power equipment is in duplicate to prevent shut-downs in an emergency and every department, excepting the tool-room, is on one floor for streamlined production. Besides electrical parts, Kurz-Kasch does all types of custom molding, produces 57 different types of radio knobs, radio cabinets, cosmetic containers, powder boxes, closures, salt and pepper shaker tops and many boxes, trays and other items from stock molds. One of the best transparent molding jobs we have seen is being turned out here.

STOCK MOLDS

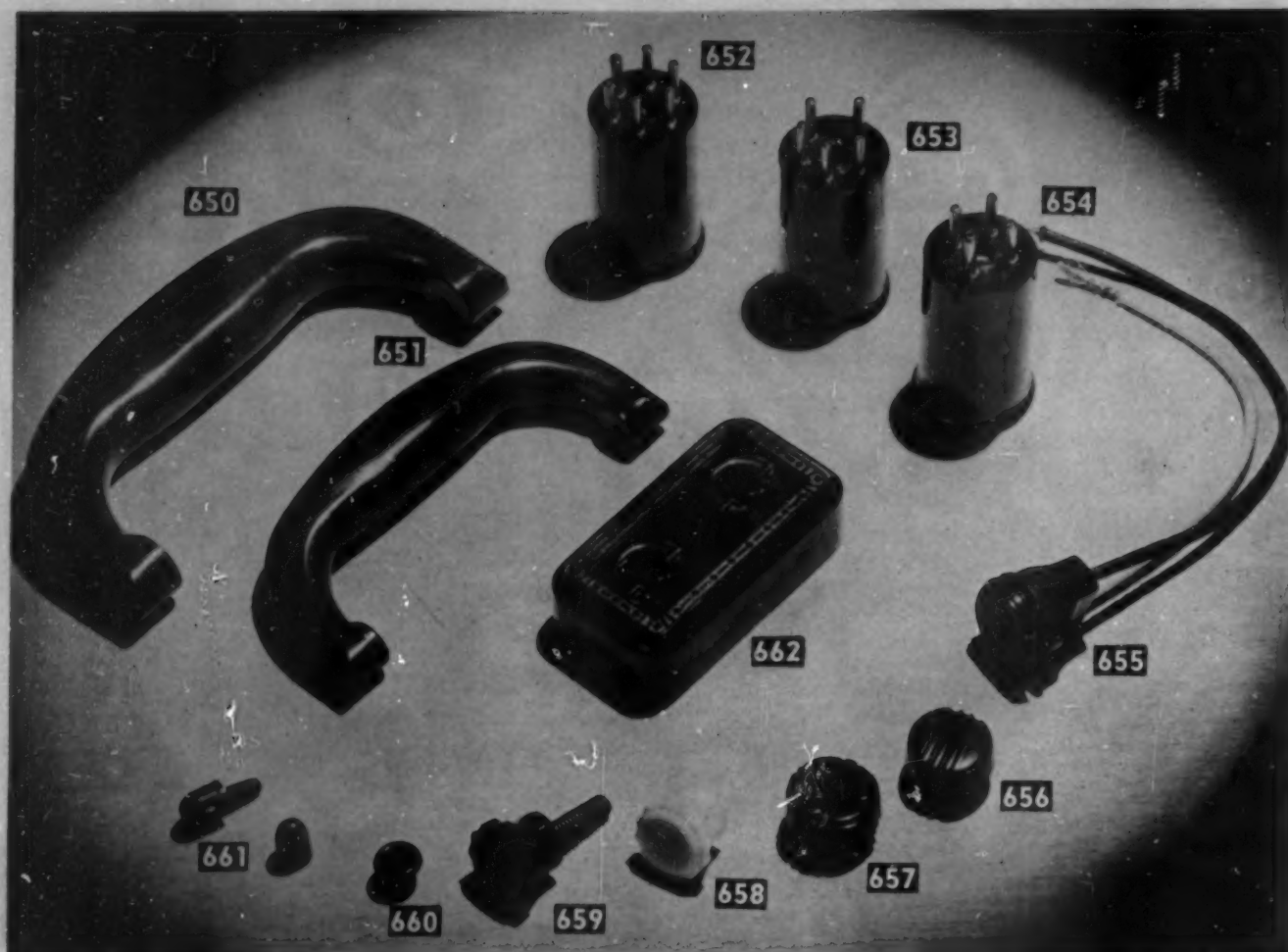
SHEET FIFTY-NINE

Additional items of urea tableware (others pictured page 38, June issue) available from stock molds. Because they are light weight and not fragile, they are popular for aircraft, trailers and camps

- 708. Tumbler 2 5/8 in. dia., 3 3/4 in. high
- 709. Platter 9 7/8 in. long, 7 in. wide
- 710. Open dish 7 1/2 in. long, 5 1/8 in. wide
- 711. Fruit or cereal dish 4 7/8 in. dia., 2 in. high
- 712. Plate 8 in. diameter
- 713. Sugar bowl 2 1/8 in. by 2 inches
- 714. Creamer about 2 1/4 in. wide and 2 in. deep
- 715. Salt and pepper shakers with removable bases for filling, 1 in. dia. at bottom, 2 3/4 in. high overall
- 716. Butter plate 5 5/8 in. diameter
- 717. Cup 3 1/4 in. dia., 2 1/4 in. high
- 718. Saucer 5 1/2 in. diameter.

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits





STOCK MOLDS

SHEET SIXTY

Miscellaneous parts which are available from stock molds. Comparatively small quantities can be purchased with economy. Interested executives should write on company letterhead when requesting samples

- 650. Luggage handle 6 in. long, 3 in. high. Openings for easy attachment
- 651. Luggage handle 5 in. long, 2 3/8 in. high. Openings for attaching
- 652. Radio tube base with six prongs. Base 1 1/8 in. dia., 2 1/8 in. high
- 653. Same as 652 with five prongs
- 654. Same as 652 with four prongs
- 655. Extension knob with openings for plug attachment
- 656. Radio control knob with set screw. Dia. across top 7/8 inch
- 657. Radio control knob, scalloped edge. Dia. across top 7/8 inch
- 658. 3/4 in. knob with metal insert
- 659. Same as 658 with threaded insert
- 660. Bushing 1/4 in. opening
- 661. Knob 1/2 in. high with and without threaded metal insert
- 662. Electrical outlet accommodates two plugs. 3 in. long, 1 9/16 in. wide, 7/8 in. high

Address all inquiries to Stock Mold Department, Modern Plastics, 425 Fourth Avenue, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

THE ORIGIN AND MECHANISM OF ADHESION IN WOOD PLASTICS

by A. J. BAILEY*

AS A SOURCE OF RAW MATERIAL IN THE PLASTICS field, wood offers almost unparalleled advantages in terms of cost, availability, and freedom from economic vagaries. It appears inevitable that wood will become an important source of material for plastics, not only in plastics of the cellulose ester and cellulose ether types, but especially in the mass-production of common articles, structural materials, etc., made directly from wood, with little or no chemical treatment, and designed for use where transparency and color are less important.

Many promising plastics made directly from wood have already been produced experimentally. Much of this development has been done in industrial laboratories and is consequently unreported. An interesting observation common to all is that chemical treatment does not appear to be a necessity. Interesting contributions to wood plastics have been made at the University of Idaho (3,4,6,8,9), by the Bureau of Chemistry and Soils (10), and the Forest Products Laboratory (1), while a patent for a wood plastic has been issued to the Masonite Corporation (7). For further information, reference is made to a comprehensive survey and discussion of lignin constitution and lignin reactions in relation to the preparation of plastics presented by Kline (5).

The success of bonding in the related sawdust briquet and fiber board fields and the fact that woodflour in air-dry condition and at room temperature can be pressed into a hard, coherent product, aroused interest as to the responsibility and mechanism of adhesion. It seemed of value to determine whether adhesion was due to: (1) reaction of the lignin, (2) plasticity of the native lignin, (3) the adhesive properties of cellulose due to particle surface attraction.

Investigative technique

Hard fiber boards were selected as a material which would permit tracing of adhesion to its source. These boards were prepared commercially by a two-hour digestion of chips in dilute sodium sulfite, followed by wash-

ing, macerating in an attrition mill, lap forming on a Fourdrinier, pressing by rolls, and drying in a plate drier using 250 pounds of steam pressure in the first section and 150 pounds in the second section. The compressing pressure on laps usually varies within the range of 200-400 pounds per square inch. Boards having a specific gravity of 1.1-1.4, a modulus of rupture of 10,000-12,000 pounds per square inch, a tensile strength of 5500-6000 pounds per square inch, and a modulus of elasticity of over 1,000,000 pounds per square inch are commonly produced on a large scale.

Thin cross sections (10-30 microns) of this board material were prepared and laid on microscope slides to dissolve out selectively the various components. The technique of dissolving a single constituent consisted of covering the thin section with a cover-glass, applying a drop or two of solvent to the edge of the cover-glass, and drawing the liquid out on the opposite side with a blotter. By using a dilute reagent at first and progressively increasing the concentration, one constituent could be removed selectively without changing the remaining structure by swelling. To remove the lignin, phenol and hydrochloric acid were used (99:1). The results obtained were checked by using another lignin solvent, sodium hypochlorite. Similarly, to remove cellulose a sulfuric acid solution was used and the results checked by cuprammonium solution. An untreated section is shown in Fig. 1 (see page 40), and similar sections after partial removal of the cellulose, and complete removal of the lignin, are shown in Figs. 2 and 3. It will be noted that cellulose appeared to furnish the structural framework and adhesion. To check this conclusion, hand sheets were prepared from pulps similar in every way except that one contained approximately 25% of lignin while the other contained none. After preparing and etching thin sections of these sheets, similar cohesion and structural integrity of cellulose residues were noted. By treating samples of the same sheets in watch glasses, it was possible to remove all lignin, wash, and dry the sheet with little apparent loss of original strength. In con-

* University of Minnesota, Division of Forestry in cooperation with the Division of Agricultural Biochemistry.

trast, complete disintegration occurred when only part of the cellulose was slowly removed. Accordingly, it appeared that a lignin-free pulp should be susceptible to plasticizing and bonding of a high order.

To demonstrate this, a sulfite coniferous pulp containing less than 0.1% of lignin was made up to a consistency of approximately 96% water and 4% pulp. It was then placed between the platens of a hydraulic press and various pressures applied within the range of 500-4500 pounds per square inch. The moisture was removed by placing dry absorbent cauls next to the platens, and replacing them as needed, making no attempt to hasten drying by raising the temperature. By this treatment, a board-like material was formed, which after air drying had mechanical properties closely approximating those of the commercial product. While quantitative tests were not made, the strength and density appeared to be similar to those of the board material described above. Inter-fiber cohesion seemed superior as shown by increased resistance to abrasion and fraying.

Further to study the bonding process, about 50 sheets of paper toweling were wetted and pressed in a laminated arrangement under the conditions outlined above. The sheets could still be peeled from each other after a few minutes under pressure. After 15 minutes, separation was impossible, and a dense, hard board resulted after

30 minutes. From this experiment it appeared that entanglement had little part in the bonding process; the essential conditions appeared to be proximity of the cellulose interfaces while the water was withdrawn. Oddly enough, increasing pressure on the platens from 500 to 4500 pounds per square inch effected little difference in the final product.

Mechanism of adhesion

Several conclusions appeared tenable. The major portion of the adhesive forces appeared to inhere in the cellulose, while the lignin which occurred in the ordinary industrial board functioned chiefly as a filler, perhaps in a partial "cementing matrix" capacity, but definitely inferior and dependent on the structural framework of cellulose. In view of the microscopic and probable submicroscopic structural relationships of lignin and cellulose in wood, it is recognized as improbable that a cementing or rigid and restricting mold function of lignin in boards might occur. Since increasing the pressure nine times caused little difference in final properties, it seemed apparent that another powerful bonding force was at work. The logical explanation seemed to parallel or coincide with Campbell's theory of hydration of cellulosic materials (2). According to this hypothesis, supported by experimental evidence from many points of attack, the general requirements for cellulose-cellulose cohesion are that the cellulose-water interfaces of micelles or crystallites be brought near enough together by external pressure to allow the forces of surface tension to bring the interfaces still closer together upon evaporation of the water. Calculated to be of the order of hundreds of atmospheres, this surface tension is believed to reduce inter-micellar distances to the region of influence of crystallizing attraction. Once brought within this sphere, crystallizing forces would further compress the structure and hold it together after evaporation of the water. Admittedly, it seems likely that in a gross structure like fiber board, the process would never be complete for all micelles and micellar surfaces, but this in no way vitiates the logic or the conclusion. The fact that external pressure is effective only to a certain stage agrees completely with the theoretic. (Please turn to page 66)



Fig. 1. Untreated thin section of board by transmitted light, section 15 microns thick, $\times 100$

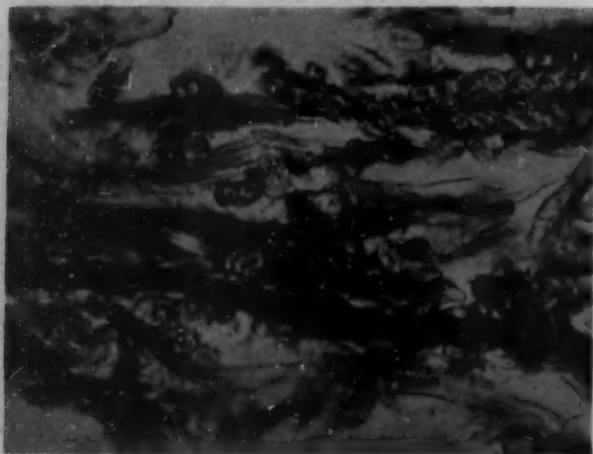


Fig. 2. Section with part of the cellulose removed showing disintegration of structure, transmitted light, $\times 100$

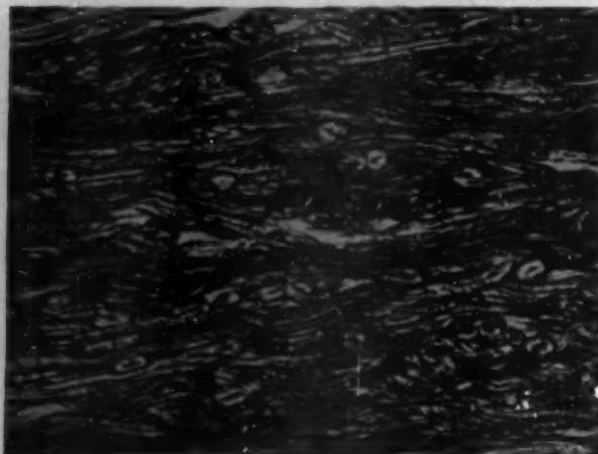


Fig. 3. Section completely delignified, residual structure intact, transmitted light, $\times 100$

PRODUCTION AND SALES OF SYNTHETIC ORGANIC CHEMICALS IN THE UNITED STATES, 1937

THE TARIFF COMMISSION HAS MADE AVAILABLE the preliminary figures for United States production and sale of dyes and other synthetic organic chemicals in 1937. Every group of products shows increased activity over the preceding year and in most cases represents all-time peak production. Among the coal-tar derivatives, the greatest increases over 1936 were shown by medicinals, flavors and perfume materials, and resins. The non-coal-tar synthetics continued to increase in quantity and variety and the output exceeded 2½ billion

pounds in 1937. The value of sales of all synthetic chemicals exceeded \$280,000,000, of which those from coal tar (including dyes) account for about 58 percent and the non-coal-tar group about 42 percent.

The peak production of 575,893 pounds of coal-tar intermediates represents an increase of 13 percent over 1936. Outstanding gains in this group are shown by those largely used in synthetic resins. Phenol production totaled 65,690,000 pounds or 35 percent more than in 1936, and the output of 45,211,000 pounds of phthalic

Table 1.—Comparison of United States production and sales of dyes and other synthetic organic chemicals, 1925–30, 1936 and 1937

	1925–30 average	1936	1937	Increase 1937 over 1936
<i>Coal-tar Chemicals</i>				
Intermediates:				
Production.....Thousands of pounds	267,492	509,706	575,893	13.0
Sales.....Thousands of pounds	109,133	223,119	242,194	8.5
Sales value.....Thousands of dollars	22,408	31,806	35,639	12.1
Finished coal-tar products: ¹				
Production.....Thousands of pounds	138,078	² 336,348	² 371,124	10.3
Sales.....Thousands of pounds	133,964	² 287,276	² 313,797	9.2
Sales value.....Thousands of dollars	65,027	² 120,765	² 127,414	5.5
Dyes—				
Production.....Thousands of pounds	94,003	119,523	122,208	2.2
Sales.....Thousands of pounds	92,207	117,573	118,010	.4
Sales value.....Thousands of dollars	39,428	63,686	64,531	1.3
Medicinals—				
Production.....Thousands of pounds	4,508	12,034	14,800	23.0
Sales.....Thousands of pounds	4,106	10,079	11,989	19.0
Sales value.....Thousands of dollars	7,464	9,763	11,496	17.8
Flavors and perfume materials—				
Production.....Thousands of pounds	3,966	3,481	4,348	24.9
Sales.....Thousands of pounds	3,919	3,437	3,899	13.4
Sales value.....Thousands of dollars	2,901	3,220	3,967	23.2
Coal-tar resins—				
Production.....Thousands of pounds	⁴ 24,442	² 117,302	² 141,099	20.3
Sales.....Thousands of pounds	⁴ 22,135	² 86,214	² 108,284	25.6
Sales value.....Thousands of dollars	⁴ 7,756	² 17,056	² 20,165	18.2
<i>Non-coal-tar chemicals</i>				
Production.....Thousands of pounds	379,972	2,041,456	2,523,893	23.6
Sales.....Thousands of pounds	264,006	1,034,921	1,168,058	12.9
Sales value.....Thousands of dollars	44,499	105,832	119,375	12.8

¹ Includes color lakes, rubber chemicals and miscellaneous coal-tar products not shown separately.

² Does not include resins from coumarone and indene, hydrocarbons, styrol, and sulfonamides.

³ Does not include resins from adipic acid, coumarone and indene, hydrocarbons, styrol, succinic acid and sulfonamides.

⁴ 1927–30 average.

anhydride represented a 45 percent increase over the preceding year. Statistics for the cresols (13,745,000 pounds) and maleic anhydride (2,114,000 pounds) are shown separately for the first time.

Activity in synthetic resins continues to increase with a record output exceeding 160,000,000 pounds in 1937 or

20 percent more than in 1936. For the first time, the output of this class of synthetic products exceeded the output of dyes. The greatest increase is shown in non-coal-tar resins, 34 percent gain over 1936, followed by alkyl resins with an increase of 30 percent and tar acid resins 14 percent.

Table 9.—United States production and sales of certain synthetic resins, 1937

	Production	Sales		
	Pounds	Pounds	Value	Unit Value
(A) Coal-tar: Total ¹	141,098,844	108,284,175	\$20,164,564	\$0.19
Derived from tar acids:				
Cresol or cresylic acid.....	10,701,463	8,466,610	976,549	.12
Phenol.....	52,472,160	50,209,349	8,615,827	.17
Phenol and cresols.....	14,046,283	13,237,663	3,424,791	.26
Xylenols.....	639,332	642,532	120,133	.19
Xylenols and cresols.....	1,985,587	989,726	163,570	.17
Alkyl resins:				
Maleic acid.....	2,803,987	2,154,988	418,183	.19
Phthalic anhydride.....	58,450,032	32,583,307	6,445,511	.20
(B) Non-coal-tar: Total ²	21,005,869	18,891,277	5,680,600	.30

¹ Does not include resins from adipic acid, coumarone and indene, hydrocarbon, styrol, succinic acid and sulfonamides.

² Includes resins from abalyn-hydrogen-nitrogen, abietic acid, acrylic acid esters, hydrocarbon, ketone, petroleum, terpenes, urea, urea and thiourea, vinyl acetate and chloride and wood rosin-methyl alcohol.

Cellulose Plastic Products

NITRO-CELLULOSE AND CELLULOSE-ACETATE SHEETS, RODS AND TUBES

December 1937

These monthly statistics on production, shipments and consumption in reporting company plants of cellulose plastic products (sheets, rods and tubes) were released by Director William L. Austin, Bureau of the Census, Department of Commerce. The data were compiled from the reports of 10 manufacturers for the months of 1937 and 1936, and January to May 1935, and of 11 manufacturers for June to December 1935, and represent practically the entire industry.

PRODUCTION, SHIPMENTS, AND CONSUMPTION IN REPORTING COMPANY PLANTS (POUNDS)

Year and Month	Nitro-Cellulose							Cellulose Acetate		
	Sheets		Rods		Tubes		Sheets, Rods and Tubes Consumed in Reporting Company Plants	Sheets, Rods and Tubes		
	Production	Shipments ¹	Production	Shipments ¹	Production	Shipments ¹		Production	Shipments ¹	Consumed in Reporting Company Plants
1937										
January.....	1,342,780	1,199,169	281,539	300,368	90,187	61,609	279,266	853,376	742,380	11,260
February.....	1,557,356	1,301,177	347,783	317,594	71,065	68,696	342,067	1,269,775	1,396,509	8,870
March.....	1,362,819	1,239,487	343,841	321,558	87,901	78,329	295,349	1,621,103	1,764,311	11,079
April.....	1,239,686	1,174,223	347,078	358,330	105,171	95,570	324,283	1,410,637	1,313,175	6,561
May.....	1,237,034	1,072,196	297,904	315,409	91,860	62,086	336,084	1,170,106	1,098,812	7,552
June.....	1,164,875	1,234,223	292,784	294,391	78,549	71,112	338,117	1,112,603	1,042,937	9,459
July.....	1,019,657	992,918	193,791	330,996	67,607	72,425	250,268	830,922	887,938	10,895
August.....	1,256,363	1,203,266	300,663	288,360	85,292	66,649	340,243	1,416,253	1,466,693	13,037
September.....	1,146,391	1,239,549	242,412	365,340	116,956	87,017	271,860	1,223,848	1,102,419	13,544
October.....	1,018,760	1,109,000	174,950	258,351	89,760	102,257	282,955	919,432	962,702	8,154
November.....	824,170	736,726	185,891	158,721	56,957	82,920	239,775	782,929	678,319	15,867
December.....	412,887	514,027	148,889	139,682	40,701	46,257	136,192	624,078	602,887	8,621
Total (Year).....	13,582,778	13,015,961	3,157,525	3,449,100	982,006	894,927	3,436,459	13,235,062	13,059,082	124,900
Total (1936).....	13,220,020	12,719,606	2,785,861	2,658,051	928,969	852,982	3,324,952	13,036,497	12,266,859	229,047
Total (1935).....	12,528,042	11,802,705	2,739,259	2,822,816	938,112	800,201	3,181,900	10,504,003	10,117,642	227,768

¹ Includes consumption in reporting company plants.

(Cellulose acetate molding compounds not included)



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PLASTICS DIGEST

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

LIBBY-OWENS-FORD GLASS CO. WINS SAFETY GLASS DECISION. Automotive Ind. 78, 639 (May 14, 1938). The plaintiff was injured by flying fragments of the windshield in an accident and asserted that the advertisements for "safety glass" convinced her that by its use she would "achieve freedom from injury from broken glass." The court ruled that the advertisement did not state that the "safety glass" was unbreakable, but that it implied that the greatest available protection against flying glass was provided by its use.

METHOD OF IMPROVING WOOD FOR STRUCTURAL PURPOSES. P. Brenner. Aircraft Engineering 10, 129-134 (May 1938). The properties of the woods in common use as constructional materials can be markedly improved by subdivision into a large number of separate layers and bonding them together by intermediate layers of synthetic resin. The improvement is greatest in regard to homogeneity (through the elimination of local flaws such as knots and faults of growth) and resistance to moisture (resulting in greater dimensional stability and strength). Species of wood which could previously be used only for low grade work, can be converted into an excellent constructional material.

ECONOMICS OF THE PLASTICS INDUSTRY. H. V. Potter. Chemistry and Industry (London) 77, 503-7 (May 28, 1938). See abstract of this paper on page 48 of the March MODERN PLASTICS.

Materials and manufacture

SHELLAC PLASTICS. PART I. COMPOSITIONS CONTAINING UREA. S. Ranganathan. Bulletin No. 30 of the Indian Lac Research Institute, Namkum, Ranchi, India (1938). Urea is one of the best accelerators for increasing the heat resistance of shellac moldings. Equal parts of shellac and wood-flour with 6% urea on the weight of shellac intimately mixed together in the presence of alcohol and carefully dried, yield molded articles of improved mechanical strength, heat resistance, and water resistance. Pre-heating of the powder for about 20 minutes at 90-95° C. improves the properties of the moldings. Addition of the urea decreases the plasticity of the molding powder but there is sufficient flow at 160° C. and 1-2 tons pressure for producing ordinary moldings. Further work is in progress on extracted shellacs, sulphur-treated lac and lac combined with amines, aldehydes, polycarboxy acids and phenols, the objective being to develop a thermohardening material or a thermoplastic modification with higher softening temperature.

FUNDAMENTALS OF CONDENSATION PROCESSES. E. Dreher. Kunststoffe 28, 114-16 (May 1938). A discussion of reaction velocities, condensing agents, isolation of intermediate products and structural features of macromolecules.

SOLVENT RECOVERY. R. Bluma. Rev. Gén. Mat. Plastiques 14, 95-8 (Apr. 1938). Three processes of solvent recovery are considered, namely, washing, condensing and absorption by solid media.

Molding and fabricating

INJECTION MOLDS FOR THERMOPLASTIC MATERIALS. P. Beyerlein. Brit. Plastics 9, 663-6 (May 1938). A general survey of constructional features of injection molds with illustrations of molds prepared by the German firm, Eckert and Ziegler.

CENTRELESS GRINDING. Brit. Plastics 9, 641-2, 659 (May 1938). A considerable economy in fabricating costs is effected by a centreless grinding machine, in which the piece to be ground is supported and held against the grinding wheel by a second wheel.

WARMING OVEN CUTS PRODUCTION EXPENSE OF FORMING BAKELITE. E. A. Dean. Elec. World 109, 1554 (May 7, 1938). As each strip is punched in the plant of the Panelyte Corporation, a heated strip is ejected from an oven within reach of the operator ready for punching. The strips pass through the oven on a chain actuated by the stroke of the punch press. Automatic loading magazines enable one individual to take care of several such ovens.

Applications

LINING STEEL PLANT WITH RUBBER. Plastics (London) 2, 158-60 (May 1938). The technique of applying rubber sheeting to the interior of chemical equipment is outlined.

STATIC ELECTRIC PROPERTIES OF A NEW PLASTIC. H. Landsberg and A. I. Ing-ham. Science 87, 419-20 (May 6, 1938). Styrene resin ranks very close to amber in insulating qualities and is recommended by the authors for atmospheric electric and Radon measurements.

PLIOFILM AS A PACKAGING MATERIAL. A. B. Cluman. India Rubber World 98, 46-7 (June 1938). The properties, methods of sealing and applications of Pliofilm, including direct contact with food and pharmaceutical items, are discussed.

SUITABILITY OF VARIOUS PLASTICS FOR USE IN AIRPLANE DOPES. G. M. Kline and C. G. Malmberg. Ind. and Eng. Chem. 30, 342-9 (May 1938) and J. Research Natl. Bur. Standards 20, 651-71 (May 1938). The tautnesses of airplane fabric doped with various plastics dissolved in a variety of solvent mixtures were determined. It was observed that the most important single factor involved in the initial tautening property of a dope is the solvent composition. Highest initial tautness values were obtained with cellulose triesters, such as cellulose triacetate and completely acylated cellulose acetobutyrate.

CREASE-RESISTING FINISHES. C. L. Wall. Textile Colorist 60, 331-4, 343 (May 1938). The tendency of cellulosic fibers such as cotton and linen to retain a crease is a fundamental reason for the superiority of wool and silk for dress and other purposes. The use of animal fibers is limited by higher cost and by such defects as discoloration of bleached fiber when exposed to light and lack of stability to alkaline detergents. However, properties of elastic recovery after deformation permit production from animal fibers of fabrics which possess comparatively large interstitial spaces and therefore contain a large volume of air, which acts as thermal insulation, giving warmth. The use of synthetic resins to endow cellulosic fibers with this property of elastic recovery after deformation is dealt with by the author.

Testing

MEASUREMENT OF HARDNESS OF PLASTICS. S. Erk and W. Holzmüller. Kunststoffe 28, 100-13 (May 1938). A detailed study of ball indentation tests on plastics, including results of tests on the effects of time and specimen dimensions on the values obtained. Data are given for elastic and permanent deformation of several types of plastics.

X-RAY STUDIES OF PLASTICS. F. Seebach. Kunststoffe 28, 117 (May 1938). Brief note on detection of crystalline impurities in phenolic plastics.

STANDARDIZATION OF FINISHING MATERIALS. E. A. Zahn. Gen. Elec. Rev. 41, 235-7 (May 1938). Benefits of standardization in the way of improved quality and economies are discussed and 15 tests for reviewing new samples are outlined, including adhesion, flexibility, resistance to water, salt-spray, acid and alkali and accelerated and natural aging.

Chemistry

RESEARCHES ON RUBBER AND RUBBER-LIKE SUBSTANCES. K. H. Meyer. Chem. and Ind. 77, 439-45 (May 7, 1938). The stretching of elastic polymers is explained in terms of molecular mechanics.

CHEMISTRY OF CELLULOSE DERIVATIVES. R. F. Conaway. Ind. and Eng. Chem. 30, 516-23 (May 1938). A review.

RUBBER PRINTING PLATES of MICROSCOPIC ACCURACY *now made possible by* **LAKE ERIE ACRAPLATE VULCANIZING PRESSES**

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U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 10 cents each

ENAMEL. R. K. Hazen (to Egyptian Lacquer Mfg. Co.) U. S. 2,115,020, April 26. Nitrostarch as a lacquer enamel ingredient is compounded with 70-110% of its weight of resins and plasticizers, pigmented as required and mixed with suitable solvents.

DENTAL PLATES. K. W. Monroe (to E. I. du Pont de Nemours and Co.) U. S. 2,115,034, April 26. A blended plastic composition for dental plates is made of granulated particles of a hard plastic in a softer, gum-colored plastic which does not dissolve the harder particles.

SAFETY HAT. J. B. Dym (to Mine Safety Appliances Co.) U. S. 2,115,063, April 26. A molded safety hat is made of fabric-reinforced plastic in a shape designed for maximum protection.

METAL FINISH. C. J. Rolle (to Ault and Wiborg Corp.) U. S. 2,115,214, April 26. A baking enamel for metals contains a copolymer of vinyl chloride and vinyl acetate, plasticized with chlorinated diphenyl. The baked film shows no orange peel effect and does not crack when the metal is bent.

SYNTHETIC ASPHALT. Wm. H. Hampton, O. E. Cushman and J. E. Fratis (to Standard Oil Co. of California) U. S. 2,115,306, April 26. Making an asphalt-like product by polymerizing olefin gases and blowing the heavy liquid polymer with air.

CASEIN PLASTIC. Wm. S. Murray (to Dairymen's League Co-operative Assoc'n) U. S. 2,115,316, April 26. Making a molding composition from milk solids (casein and lactose) by treating with a weak acid, a tanning agent and an alkali, then heating with water at 100-120°C.

SAFETY GLASS. B. C. Bren (to E. I. du Pont de Nemours and Co.) U. S. 2,115,514, April 26. Cellulose acetate (acetyl number 51-54.5) is plasticized with 80-100% of its weight of dimethyl phthalate for use as a safety glass interlayer.

MOLDING PHENOLICS. C. A. Hochwalt and N. N. T. Samaras (to Monsanto Chemical Co.) U. S. 2,115,524, April 26. Flowability of phenol-aldehyde resins in the mold is improved by adding 10% or less of a diphenyl derivative.

MOLDING COMPOSITION. C. Ellis (to Ellis-Foster Co.) U. S. 2,115,550, April 26. Compounding 3 to 9 parts of urea-aldehyde resin sirup with 1 part cellulose to form a composition which hardens rapidly at 140-150°C and can be taken hot from the mold.

VARNISH RESIN. P. E. Marling (to Monsanto Chemical Co.) U. S. 2,115,557, April 26. A tough, rubbery resin which gives a flexible, waterproof varnish film is made by heat-bodying castor oil, reacting it with a glycol or glycerol and an unmodified phenol-aldehyde resin.

BLEACHING RESINS. C. A. Thomas, F. J. Soday and W. R. Derby (to Monsanto Chemical Co.) U. S. 2,115,564, April 26. Color-imparting impurities in resins from polymerized cracking still unsaturates are removed by controlled treatment with sulphuric acid.

FOIL BACKING. H. G. Kittredge and F. W. Williams (to Foilfilm, Inc.) U. S. 2,115,584, April 26. A coumarone-indene resin is compounded with nitrocellulose and heavy coal tar oil to make a backing for metal foil.

MOLDING MACHINE. Chas. D. Ryder (to Grotelite Co.) U. S. 2,115,590, April 26. An injection molding machine is adapted to be opened and closed by fluid pressure, and has clamping devices operable by fluid pressure acting in a direction perpendicular to the direction of the fluid pressure employed to open and close the mold; the machine also has means for injecting the molding composition after the mold has been closed and clamped.

PLASTICIZER. B. Andersen and A. F. Caprio (to Celluloid Corp.) U. S. 2,115,700, May 3. Plasticizing cellulose derivatives with the lactates, hydroxybutyrate, tartrates or citrates of partially etherified polyglycols.

PLASTICIZER. Henry Dreyfus U. S. 2,115,708, 2,115,709 and 2,115,710, May 3. Plasticizing cellulose derivatives (esters such as the acetate, or ethers such as methyl, ethyl or benzyl cellulose) with alkyl or alkoxyalkyl esters of polycarboxylic acids, e. g., those in which at least one carboxy group is esterified with an acylated methyleneglycol radical.

ZEIN COATINGS. D. W. Hansen (to Prolamine Products, Inc.) U. S. 2,115,716 and 2,115,717, May 3. Protein (prolamine base) coatings are plasticized with an amino acid ester which also serves as an antiblushing agent. The protein may be zein.

ASPHALT VARNISH. J. K. Hunt and J. H. Shipp (to E. I. du Pont de Nemours and Co.) U. S. 2,115,775, May 3. Mixing heat-treated gilonite with a soluble alkyd resin (modified with rosin and drying oil) to make a varnish.

WATERPROOFING. M. H. Belloc (to Societe Nobel Francaise) U. S. 2,115,797, May 3. Waterproofing paper, fabrics, regenerated cellulose foils and like materials with a polyvinyl acetal resin containing a small proportion of a natural or synthetic wax.

RUBBER SUBSTITUTE. Peter J. Gaylor (to Standard Oil Development Co.) U. S. 2,115,896, May 3. Plasticizing a hard, brittle vinyl resin by precipitation from solution in presence of a high boiling plasticizer.

ABRASIVE WHEEL. Chas. E. Wooddell, Chas. S. Nelson and Roy Lincoln (to Carborundum Co.) U. S. 2,115,897, May 3. Attaching blocks of bonded abrasive to a flexible band by a layer of synthetic resin cement, and forming the band and blocks as the rim of a grinding wheel.

MOLDED ARTICLES. A. Gams, G. Widmer and K. Frey (to Ciba Products Corp.) U. S. 2,116,019, May 3. Making a fusible aniline-formaldehyde resin by acid condensation, and effecting the final condensation and hardening to the infusible state in the mold.

COATED SHEET MATERIAL. J. L. Elliot (to International Printing Ink Corp.) U. S. 2,116,065 and 2,116,066, May 3. Coating a cellulosic base sheet with a rubber cement containing an alkyd resin which aids the rubber solution to wet the sheet, and finishing with a coating of a plasticized cellulose ester.

PHENOLIC RESIN. S. L. M. Saunders U. S. 2,116,084, May 3. Making a resin by condensing p-cresol dialcohol with di-p-cresylol-ethane in acid medium.

VARNISH RESIN. Israel Rosenblum U. S. 2,116,125, May 3. Making a fusible oil-soluble alkyd resin from glycerol, a mixture of phthalic and succinic acids and acids derived from a fatty oil.

TOBACCO PIPE COATING. Andrew Buschman U. S. 2,116,186, May 3. Coating the outside of pipe bowls with a lacquer containing nitrocellulose and urea resin, so compounded that heat inversion occurs when the pipe is smoked, and the film becomes acidproof and insoluble in its own solvents.

ELECTRICAL INSULATION. F. Klimmer (to Felten und Guilleaume Carlsberg A.-G.) U. S. 2,116,267 and 2,116,268, May 3. High frequency conductors with air space insulation between the inner and outer conductors have a spiral winding of coiled polystyrene thread as the spacer between the conductors. (Please turn to page 48)



VERSATILITY

*A*s illustrated these moldings probably mean little or nothing, but as parts in the assembly of electrical appliances, industrial machines, recording devices and automotive ignition systems they render important and more than satisfactory service. The demand for one or more special properties in each application is readily fulfilled by the use of DURITE.

Investigate DURITE PLASTICS—write to the exclusive producers of phenol-furfural resins.

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U. S. PLASTICS PATENTS

(Continued from page 46)

ELECTRICAL COILS. J. B. Miles, Jr. (to E. I. du Pont de Nemours and Co.). U. S. 2,116,318, May 3. Impregnating electrical coils with a mixture of polymerized and monomeric methacrylate esters.

HYDROCARBON RESINS. Julius Hyman (to Velsicol Corp.). U. S. 2,116,499, May 10. In polymerizing cracking still unsaturates to resinous products in presence of adsorbent catalysts, the catalyst is first saturated with water vapor.

PRINTING PLATES. R. H. McKee (to Cellu-Type Plate Co.). U. S. 2,116,536, May 10. A hardenable composition for making printing plates contains suitable proportions of plasticized cellulose derivatives having different viscosities.

SPONGES. L. P. G. Vautier, St. J. des Marais and C. Carnot (to Societe Francaise de la Viscose S. A.). U. S. 2,116,611, May 10. Viscose sponges having like breaking strength in all directions are made by molding a viscose-fiber composition to form an oriented structure and sectioning the structure across the grain of orientation, pressing to disorientate the sections, and coagulating the viscose.

BLENDED RESINS. H. W. Matheson and G. O. Morrisop (to Shawinigan Chemicals, Ltd.). U. S. 2,116,635, May 10. Making a mixed vinyl resin by hydrolyzing a polyvinyl ester, condensing the resulting alcohol with an aldehyde, then further hydrolyzing and condensing with a different aldehyde.

CABLE. Helge Rost. U. S. 2,116,643, May 10. A flexible insulating cable sleeve is made of pure polystyrene.

ADHESIVE. O. R. Kreimeier and R. W. Maxwell (to E. I. du Pont de Nemours and Co.). U. S. 2,116,867, May 10. Making adhesives by alkylating starch with methyl (or ethyl) sulphate.

SOUND RECORD. H. F. Stose (to Radio Corp. of America). U. S. 2,116,986, May 10. A vinyl resin with diatomaceous earth as filler is used in making phonograph records.

LAMINATED MATERIAL. G. R. Ensminger (to E. I. du Pont de Nemours and Co.). U. S. 2,117,085, May 10. In bonding metal to wood the metal is coated first with a primer, then with the adhesive. The primer is an alkyl resin or an oil.

MOLD. Peter Kopp. U. S. 2,117,179, May 10. Apparatus for continuous production of molded, finally hardened synthetic resin articles in extruded lengths.

MOISTUREPROOF PAPER. Bert C. Miller (to Bert C. Miller, Inc.). U. S. 2,117,199 and 2,117,200, May 10. Moistureproofing paper or wrapping foils with a metal soap and plasticized ester gum, or with an alkyl resin applied from a melt and quickly cooled to effect surface bonding without impregnating the paper or foil.

ADHESIVE. E. C. Pitman (to E. I. du Pont de Nemours and Co.). U. S. 2,117,209, May 10. Joining surfaces by coating with a cellulose derivative, drying and then activating with a blended solvent.

MOLDING RESINS. H. Rein (to I. G. Farbenindustrie A.-G.). U. S. 2,117,210, May 10. Molding polyacrylonitrile resin from solution in presence of a pyridinium compound.

ALKYL RESINS. R. Priester (to N. V. Industriële Mij. Voorheen Noury en Van Der Lande). U. S. 2,117,255, May 10. Modifying an alkyl resin with castor oil in which the hydroxy group is esterified with naphthenic or unsaturated or saturated fatty acids.

PLASTICIZER. H. A. Bruson (to Röhm and Haas Co.). U. S. 2,117,293, May 17. As a plasticizer, an airblown crotonate of a glycol or glycerol.

POLYMER RESIN. R. Hill (to Imperial Chemical Industries Ltd.). U. S. 2,117,321, May 17. Copolymerization of a mixture of methyl methacrylate and another polymerizable unsaturated ester.

POLYCRYLATES. H. T. Neher (to Röhm and Haas Co.). U. S. 2,117,349, May 17. Polymerizing secondary or tertiary butyl acrylate or amyl acrylate.

VISCOSE SPONGE. T. F. Banigan (to E. I. du Pont de Nemours and Co.). U. S. 2,117,392, May 17. Making viscose sponge in a ferrous metal container by coagulation with a liquid containing a non-acidic alkali metal phosphate.

ABRASIVE WHEEL. A. G. Scutt and A. L. Ball (to Carborundum Co.). U. S. 2,117,513, May 17. Making an abrasive wheel with hard abrasive grains, filler grains of an infusible condensation resin and a synthetic resin binder.

VULCANIZED PLASTICS. C. H. Alexander (to B. F. Goodrich Co.). U. S. 2,117,591, May 17. Vulcanizing vinyl halide resins with an arylamine: aldehyde condensation product.

PHOTOGRAPHIC TRACING CLOTH. G. F. Nadeau and H. R. Couch (to Eastman Kodak Co.). U. S. 2,117,814, May 17. Photosensitized tracing cloth is coated on one face with a gelatin:nitrocellulose layer, then with nitrocellulose, then with gelatin and finally with the sensitive emulsion, and on the other face with a layer of nitrocellulose and finally with cellulose acetate.

FILM SCRAP. G. F. Nadeau and L. K. Eilers (to Eastman Kodak Co.). U. S. 2,117,815, May 17. Separately recovering cellulose ester and plasticizer from colloiddized scrap by leaching the scrap with aqueous methyl alcohol, then extracting the plasticizer from the alcohol with a hydrocarbon solvent.

CELLULOSE ESTER FOIL. Henry B. Smith (to Eastman Kodak Co.). U. S. 2,117,827, May 17. Transparent foil containing 100 parts of a cellulose mixed ester and 10-30 parts dicapryl adipate.

RAYON CAKE SUPPORT. H. R. Moyer (to Westinghouse Electric and Mfg. Co.). U. S. 2,117,902, May 17. A molded laminated insert for supporting rayon cakes is made of fibrous sheets impregnated with a condensation resin and shaped under heat and pressure.

ELECTRICAL INSULATION. M. M. Safford (to General Electric Co.). U. S. 2,118,017, May 17. Insulation for wire conductors is made of polyvinyl halide plasticized and pigmented to give low dielectric loss and low power factor at high temperatures.

RESIN-IMPREGNATED ARTICLES. P. C. P. Booty and R. G. Booty. U. S. 2,118,036, May 24. Articles of wood or other material, after being impregnated with a phenol-formaldehyde resin, are treated with a hot solvent to remove the surplus resin.

ANTISTATIC FILM. A. D. Slack and A. A. Young (to Eastman Kodak Co.). U. S. 2,118,059, May 24. A nitrocellulose photographic film has an antistatic layer of gelatin with a sulphated higher alcohol.

SURGICAL TAPE. E. H. Nollau and D. A. Rankin (to E. I. du Pont de Nemours and Co.). U. S. 2,118,101, May 24. Adhesive tape which resists soiling and is waterproof is coated with rubber adhesive on one side and with nitrocellulose on the other side.

AMINE RESIN. T. Sutter (to Ciba Products Corp.). U. S. 2,118,482, May 24. Effecting arylamine:formaldehyde resin condensations with the aid of a phenolpolyalcohol.

LAMINATED PRODUCT. J. D. Cochrane, Jr. (to Formica Insulation Co.). U. S. 2,118,549, May 24. Making laminated products by joining to a base a sheet coated on its outer side with a pigmented resin varnish and on its inner side with a different resin varnish serving as the bonding agent.

POLYVINYL ESTERS. H. Rein (to I. G. Farbenindustrie A.-G.). U. S. 2,118,713, May 24. Nitrogenous polyvinyl esters are made by action of an amine on polyvinyl chloroacetate.

PAINTS. E. C. Clayton and L. L. Heffner (to Wm. E. Hooper and Sons Co.). U. S. 2,118,787, May 24. A substance such as paraffin, rubber, vinyl resin, tung or castor oil, fish oil or the like is chlorinated to about 60% chlorine and the product is used in paints, together with a finely divided borate of zinc, magnesium or manganese.

ALFRED A. MORSE *Advertising* 15 JOHN STREET, NEW YORK

COrtlandt 7-2440

*More Eloquent
Testimony . . .
Than Any We Could Speak!!*

May 18, 1938.

Modern Plastics,
425 Fourth Avenue,
New York City.

Attention of Mr. Charles A. Breskin, Publisher

Gentlemen:

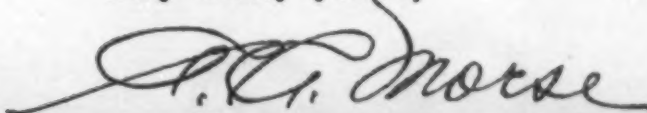
You will be interested, we feel sure, in the experience of one of our clients, Peerless Roll Leaf Co. Inc., Union City, N.J., in connection with MODERN PLASTICS.

From a one-quarter page advertisement appearing in the February, March, April and May issues of your magazine they have secured to date over one hundred inquiries from various firms in the plastic field. Although the advertisement offers a small premium, the percentage of curiosity seekers has been very small. Most of the inquiries have come from worthwhile prospects. Inquiries are still coming in at the rate of one or two a day.

There is no question in our minds as to the pulling power of your magazine.

Very truly yours,

AAM:ED



FOR FURTHER PROOF OF MODERN PLASTICS
PULLING POWER — for full information, for advertising rates and schedules — write now to

MODERN PLASTICS

Advertising Department

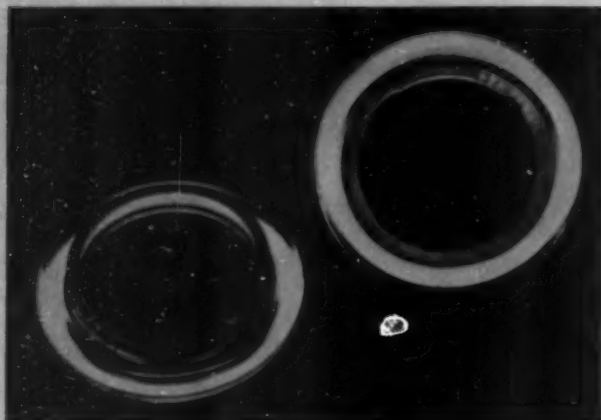
425 Fourth Avenue

New York City

JULY 1938

49

NEWS



LUMINOUS PROCESSES, INC., ARE DOING EVERYTHING THEY can to keep people from bumping their noses on doors in the dark and to help them find door knobs without groping in the dark. They provide this luminous escutcheon which replaces the metal ring around the lock cylinder which makes it easy to find the key hole or door knob.

The device is simple enough and consists of an injection molded Lucite ring with luminous material imbedded in the back.

A very narrow band of the material is sufficient since the curved surface on the front of the ring magnifies the luminous inlay making it appear to be a much broader band than it really is. The Lucite rings are injection molded by Elmer E. Mills Corporation.

The photograph illustrating them was made with no other artificial light than the radiance thrown by the rings themselves in the dark. No daylight was used, they were simply set up in a dark room and exposed to the camera over a rather extended period of time.

CENSUS OF MANUFACTURES. THE CANVASS FOR THE 1937 Biennial Census of Manufactures was begun by the Division of Manufactures, Bureau of the Census on January 25, 1938. Questionnaires were mailed to all establishments whose total value of products during 1937 was believed to have amounted to \$5000 or more. All manufacturers of Plastic Products, who were listed, were sent copies of questionnaire, Form 315, upon which to report personnel and wage-earner data, costs of materials consumed, including fuel and electric energy, values and kinds of products, and inventories at the beginning and end of the year. Even though 70 percent of these have been returned to date, the remaining 30 percent will hold up the release of the figures for the industry.

The value of these production statistics is enhanced in proportion to the promptness with which they are released. We are assured by officials of the Census Bureau that preliminary statistics for our industry will be released within a very short time after data from establishments have been collected. It is, therefore, to the best interests of all members of the industry to respond promptly and make possible the early release of this valuable information. In the event that the questionnaire form has been misplaced and an additional copy is needed, address the Division of Manufactures, Bureau of the Census, Washington, D. C., and a copy will be supplied to you immediately. The Division of Manufactures is already receiving numerous requests for this information, **SO PLEASE MAIL YOUR SCHEDULES PROMPTLY.**

MORE THAN 900 VISITORS ATTENDED THE OPENING OF THE Bakelite Travelcade at Franklin Institute, Philadelphia, on the evening of June 15th. About 200 guests of the Institute were welcomed in the auditorium by Philip C. Staples, president of the Franklin Institute, and the purpose of the Travelcade was explained by Louis M. Rossi, vice-president of the Bakelite Corp.

Floyd Parsons, well-known author and editor, addressed the gathering on current economics and enumerated in a fair and nonpartisan manner some of the fallacies of our governmental administration. He

stressed the fact that no institution, private or otherwise, could continue for an indefinite period to spend more than it earns, or more than its income earned or otherwise; and enjoy any continued success.

Mr. Parsons pointed to some of the indications that the great majority of American citizens of the middle class will assert themselves and that the situation in Washington will in this way be corrected before long. He further pointed to the fact that opportunity still exists in America and that much effort which is now devoted to criticism could be better devoted to the more constructive purpose of seeking additional business.

One company in which he owns stock, he mentioned, sent a notice with a recent dividend which said: "We have done a little better this year than last because competition is less keen. Our competitors, believing there is no business, are not going after it, but we are."

The Travelcade as set up at the Franklin Institute is an impressive exhibit and should contribute no end to informing the visiting public of the advantages of plastics and to give them a better idea of the extent to which these materials are employed in all major industries. The exhibit will remain at the Franklin Institute until December, this year.

F. J. STOKES MACHINE CO., ANNOUNCES THAT IT IS THE sole sales agent for the Standard Machinery Company's complete line of hydraulic presses.

ASSOCIATED ATTLEBORO MANUFACTURERS, INC., AN- nounce that they offer their customers the designing services of Jan Streng, one of the foremost plastic designers of the east. Mr. Streng gives Associated Attleboro and their clients the benefit of a wide and successful experience.

Among his noteworthy efforts have been outstanding radio designs, which have appeared in such lines as Emerson, Colonial, Pilot, Clinton, American Bosch, Westinghouse and Philco. His service will be available for any type of plastic merchandise, and the company feels that his addition to their technical engineering staff places them in a position to design and develop any molded problem that can be presented.

AFTER A FEW YEARS USE BY SEVERAL FOUNDRIES, GENERAL Plastics, Inc., announce their 278 impregnating resin to be commercially available. This solution of specially formulated resin is for increasing the density of certain types of castings. Castings of the proper alloy, of course, will withstand high liquid or gaseous pressure, but often an alloy may be specified for reasons of chemical resistance which may not be the most desirable type for casting a solid, non-porous structure. Occasionally, too, the necessary design of the casting may present problems in manufacture which cause difficulty in feeding in the correct way to overcome shrinkage. Slight porosity of castings which results from these causes is successfully overcome and the casting made tight by the use of this 278 resin solution. Proper impregnation is made by pressure or vacuum and pressure. After impregnation the casting is baked at 250° F. or higher to set the resin. When hardened in this way the resin is practically unaffected by water, solvents, mild alkalies and acids.

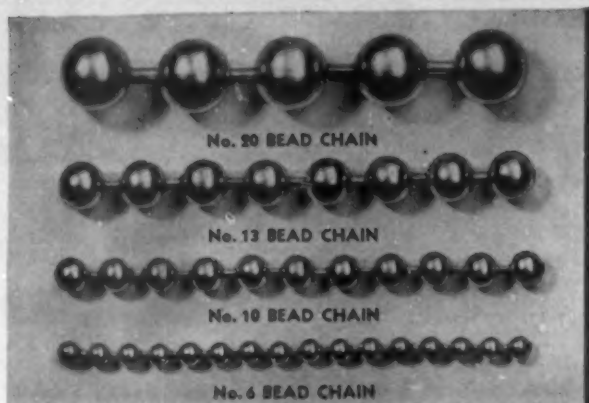
BECK, KOLLER & COMPANY INC., DETROIT, MICH., MANU- facturers of synthetic resin coatings, announces that its company's name has been changed to Reichhold Chemicals, Inc.

CELLULOID CORPORATION ANNOUNCES THE REMOVAL OF its New England sales office to the Foster Building, Leominster, Mass.

SYNTHANE CORPORATION ANNOUNCES THE INTRODUCTION of a new Bakelite laminated material. In place of the usual paper or fabric base, this material uses a woven glass fabric. Glass, tests show, gives a low moisture absorption which has not been duplicated previously in laminated phenolic resinoid materials. Other advantages reported are a minimum change in electrical characteristics, and greater resistance to the action of corrosive liquids.

MODERN PLASTICS' EXHIBIT OF MOLDED, CAST AND LAMI- nated products is again open to the public at 425 Fourth Avenue, New York City. This display which illustrates the products of many companies and which was visited last year by more than five thousand people occupies the entire entrance foyer on the 10th floor. Our readers are cordially invited to come in and look around.

INGENUITY



BEAD CHAIN*

... is a series of metal swivels that form a smooth running non-kinkable chain of unexpected strength, that has been put to many ingenious uses.

For almost twenty-five years we have been developing assemblies of distinctive beauty and utility, and have assisted many manufacturers in advantageous and economical methods of adapting BEAD CHAIN* to their products.

BEAD CHAIN* is made in standard sizes, illustrated here, of brass, nickel, silver and other metals in natural, gold and chromium plate finish, with couplings and attachments for your needs.



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THE BEAD CHAIN MANUFACTURING CO.
80 Mt. Grove St. Bridgeport, Conn.

*Trade Mark Reg. U. S. Pat. Off.



CREATING Prize Winners

CALLS FOR THE Right MOLD STEEL*

AND it is significant to note that at least half of the year's prize winning plastics were produced in molds made from Carpenter Electric Furnace Mold Steels.

*Carpenter Samson was chosen for the molds which produced the Wee Tot containers, winner of one of the recent Packaging Awards. Samson is readily hobbled—takes a fine finish—and resists up-setting and abrasion.

To assist you in selecting the right mold steel, we have prepared a bulletin with complete data on the four types of Carpenter Mold Steels available.

Write today for your free copy of this 18-page illustrated bulletin. It shows how to cut down rejects—and how to reduce costs.



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THE CARPENTER STEEL COMPANY

112 W. BERN ST., READING, PA.

Makers of Fine Tool Steels Since 1889

PUBLICATIONS

Booklets reviewed in these columns will be sent without charge to executives who write for them on their company letterheads. Other books will be sent postpaid at the publishers' advertised prices.

Photoelements and Their Application

by Bruno Lange, translated by Ancel St. John

Published by Reinhold Publishing Company, New York

Price \$5.50

297 pages, 167 illustrations

This book, which to our knowledge is the only one dealing exclusively with photoelements, is divided into two parts, one concerned with the historical development, theoretical aspects and physical properties of the photoelements, and the other with technical uses of photoelectric devices. The translation suffers from being excessively literal and incorporating intact minor errors which appeared in the original, but this is somewhat compensated for by a greatly enlarged index to supplant the incomplete one in the German edition. The literature is only covered to approximately the date of the German manuscript (September 1935). Physicists, engineers and laymen in this country interested in applications of photocells should find the English edition a useful and convenient source of such information.

Symposium on Plastics

Published by the American Society for Testing Materials, Philadelphia, 1938

Price 75 cents (to ASTM members 50 cents)

51 pages

The six papers comprising the major portion of the published symposium discussed various properties of plastics, methods available for determining same, and the significance of the more important tests. The titles in brief and the authors of these papers are as follows:

- "Properties of an Ideal Plastic"—A. F. Randolph
- "Strength Properties of Plastics"—H. M. Richardson
- "Thermal Properties of Plastics"—W. A. Zinzow
- "Flow Relations of Thermoplastics"—Chester H. Penning and Leslie W. A. Meyer
- "Hardness as Applied to Plastics"—J. C. Pitzer
- "Permanence of Plastics"—G. M. Kline

Discussion of the papers presents viewpoints of others engaged in this field. Several of the authors have included in tabular form data from many different sources, thus presenting it in easily accessible form.

TWO BOOKLETS HAVE JUST BEEN ISSUED BY CELLULOID Corporation one entitled "Lumarith Library of Color, a Reference File," the other "Lumarith Testing Methods."

15,000 colors were chosen for the Library, each color, being representative for its application, its use, its originality, or appeal.

"Lumarith Testing Methods" is divided into two sections. The first, testing molding material, outlines several tests to decide the proper material for the article in mind. The second, testing the molded article outlines the tests for revealing whether the right formula has been used for the application under optimum molding conditions.

MAGNETIC MOTOR-STARTING SWITCH, REVERSING DRUM Switches, Manual Motor-Starting Switch, Magnetic Crane Control, and Photoelectric Relay are titles of some of the pamphlets General Electric Co. has recently published.

THE GROBET FILE CORPORATION OF AMERICA HAS PUBLISHED a complete catalog illustrating and describing their line of Swiss files for precision work.

RÖHM & HAAS COMPANY, INC., HAS RECENTLY PUBLISHED A four-page folder describing Crystalite, a thermoplastic acrylic compression molding material which is synthesized from the same raw materials as Plexiglas and Plexigum, other well established acrylic de-

rivatives made by the company. Like all acrylic resins, Crystalite is basically characterized by extraordinary colorless transparency, excellent chemical resistance and outstanding aging and weathering properties. Physical properties and other characteristics of the material are listed and a number of molded pieces are shown in the illustrations.

A CATALOG OF HIGH VACUUM PUMPS WHICH PRESENTS A comprehensive story of higher vacuum, its applications, advantages and economies in industry, is published by F. J. Stokes Machine Co. The booklet is filled with data, charts, graphs and tables which are valuable for reference purposes.

GEORGE GORTON MACHINE CO. HAS ISSUED A 40-PAGE booklet called "Instruction Book and Parts Catalog" which gives detailed directions to users of pantograph engraving and die cutting machines for making copy, masters and models in various materials. Three dimensional work is discussed and area charts are included in this handy reference booklet.

HAVEG CORPORATION HAS ISSUED A GENERAL BULLETIN ON Corrosion Resistant Chemical Equipment which describes the physical qualities of Haveg, a phenolic plastic with unique properties of acid resistance. Tanks, towers, pipes and other equipment of unbelievable dimensions are constructed from this material and many of these applications are pictured in this bulletin.

THE STORY OF KOPPERS COMPANY, THE INDUSTRIAL Organization which has grown to become a producer of equipment to prepare coal for use as such, or through coking and distillation, to obtain its products, is told in "Koppers Yearbook—1938."

A MACHINE OPERATOR TELLS ABOUT MACHINE TOOLS IN A 16-page booklet issued by the National Machine Tool Builders' Association. Vertical boring mill, tapping machine, radial drill, micrometer and other machines are illustrated and described.

A NEW, ILLUSTRATED, 4-PAGE, TWO-COLOR BULLETIN GIVING details of construction and installation hook-ups, on the Adasco Vertical Float Type Steam Trap with or without thermostatic air bypass, is published by the American District Steam Co., manufacturers of expansion joints, tile conduit and other steam distribution equipment.

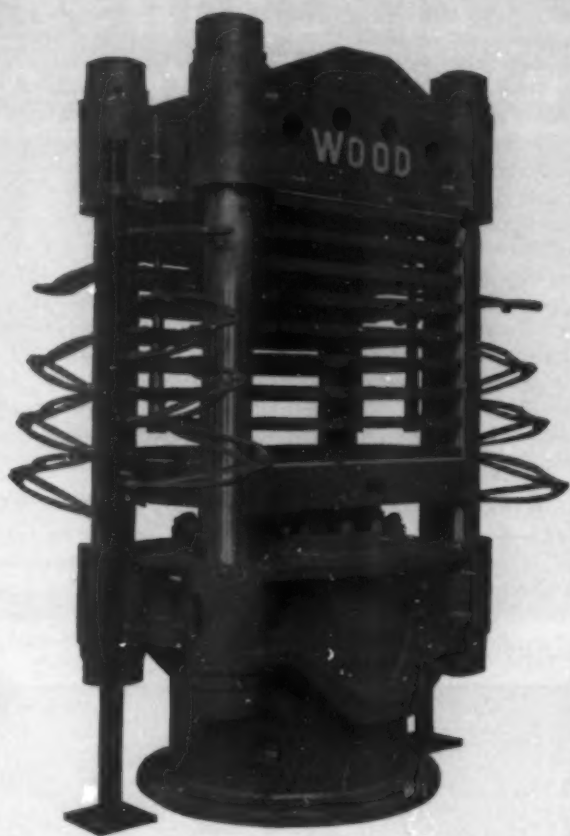
A NEW BULLETIN, NO. 38-A, HAS JUST BEEN PUBLISHED BY the Electric Air Heater Company, Division of the American Foundry Equipment Company on their new line of Electromode electric unit heaters for commercial and industrial use.

"RHOPLEX DISPERSIONS PERMANENT FINISHES FOR TEXTILES" is the title of a twenty-page booklet recently released by Röhm & Haas Company, Inc. Rhoplex dispersions are indicated as new and unique aqueous suspension of clear, colorless, flexible resins which have been especially developed for the treatment of textile fibers and fabrics to produce distinctive, striking and permanent finishes. Physical properties and other specifications together with methods of application, preparation of mix, impregnation of fabric, fixation of the resin, solvents and dryers are clearly set forth. The booklet is a revelation of the extent to which resins are being used as finishing materials.

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS Company has issued a pamphlet describing their seamless flexible metal tubing, and answering the questions often asked about its characteristics and properties.

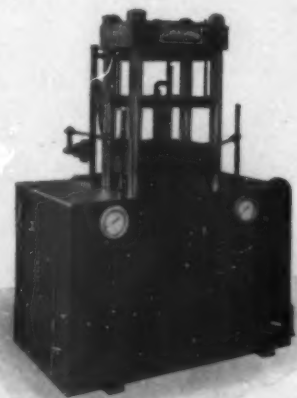
"IMPULSE STEAM TRAP" IS THE TITLE OF A TWELVE-PAGE booklet issued by the Yarnall-Waring Co. which describes and illustrates the construction of the traps.

CATALIN CORP. HAS ISSUED A COLOR CHART WITH SMALL Catalin disks which illustrate some of the many colors in which the material is available. Specifications of sizes and weights are given for cylinders, standard sheets, square rods, round rods, hexagonal rods and octagonal rods, also weight of Catalin per cubic inch.



HYDRAULIC PRESSES FOR THE PLASTICS INDUSTRY

Some presses that would be considered as "special" by others, are to be found in the standard line of the R. D. WOOD CO. Be sure to consult us regarding your press requirements.



(Above) An 8-opening, steam platen press operating on 2000 lbs. per square inch working pressure. Platen size—40" x 40".

(Left) A 50-ton Hydro-Lectric steam platen press with self-contained pumping unit. Pumps, motor, valves and piping are fully enclosed.

ESTABLISHED 1803

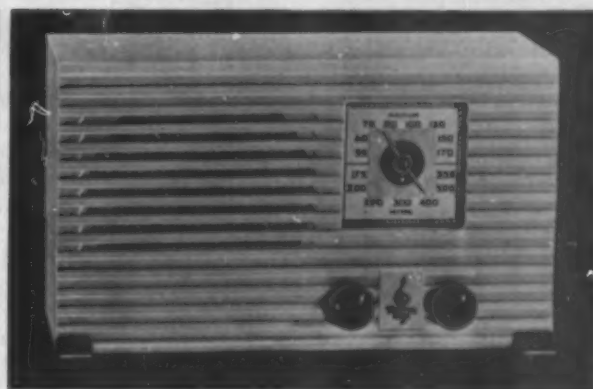
R. D. WOOD CO.

PHILADELPHIA, PA.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE



BEGINNING... 1939!!



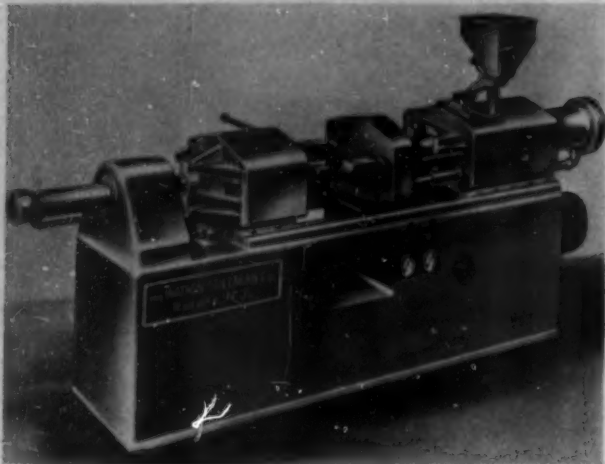
July is January to Associated Attleboro. Already we are ringing in the new year, hard at work on the 1939 models for leading plastic users.

We have just completed these two distinctive 1939 Emerson cabinets . . . two of a long line of Emerson housings turned out by us during the past years. Manufactured of different materials, different in style and size, they both incorporate one single standard of fine workmanship, efficiency in production and uncommon economy.

If you are contemplating a plastic product for 1939—bring it to the molder who is already in full stride for 1939 production . . . six months ahead of the market, and miles ahead of others in the field.

**ASSOCIATED ATTLEBORO
MANUFACTURERS, INC.**
ATTLEBORO, MASS.

EQUIPMENT



THE WATSON-STILLMAN COMPANY ANNOUNCES THE NEW and improved No. 6 Wasco Hydraulic Automatic Injection Molding Machine. It is a complete, self-contained unit arranged for manual, semi-automatic or full automatic operation, with a six oz. capacity. Incorporated in this new machine are several features that assure faster operation and increased production. With a 24 in. maximum opening between die plates and an adjustment of 18 in. on the clamping end, dies 6 in. thick and up can be accommodated.

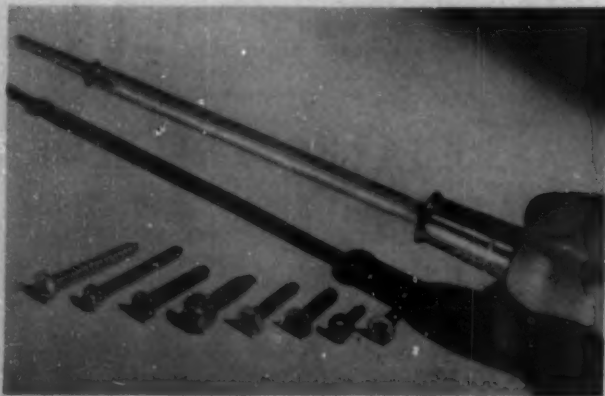
Dies having up to 50 sq. in. projected area are held closed by the patented clamping device without transmitting strain to the rest of the machine. Adjustment of the nozzle end each time dies are changed is not required. The heating cylinder has a greater plasticizing capacity and concentrated heat is unnecessary, eliminating one of the main causes of burned material. The bore of the heating cylinder is smooth and of uniform diameter. There is absolutely no place for material to lodge. This is a distinct advantage when changing from one color to another.

To clean the contact bushing the operator need only move a small lever. This causes the die plate to move forward, away from the nozzle. The die plate is automatically returned to and locked in the molding position by the following die closure.

DUSTROL, A COMPACT, SELF-CONTAINED DUST COLLECTOR, requires but 29 in. by 21 in. floor space. It can be placed adjacent to dust-producing equipment and connected to the latter by means of a short duct or hood to catch the dust thrown off.

The collector handles most industrial, dry, chemically inert dusts and particles, and is particularly effective for abrasive wheel particles, buffing and polishing compounds, etc. Available from the Falstrom Co.

OF INTEREST PARTICULARLY TO DESIGN ENGINEERS IS THE new American Plus Screw with the patented Phillips recessed head. Reports from the manufacturer indicate that because the screw clings to

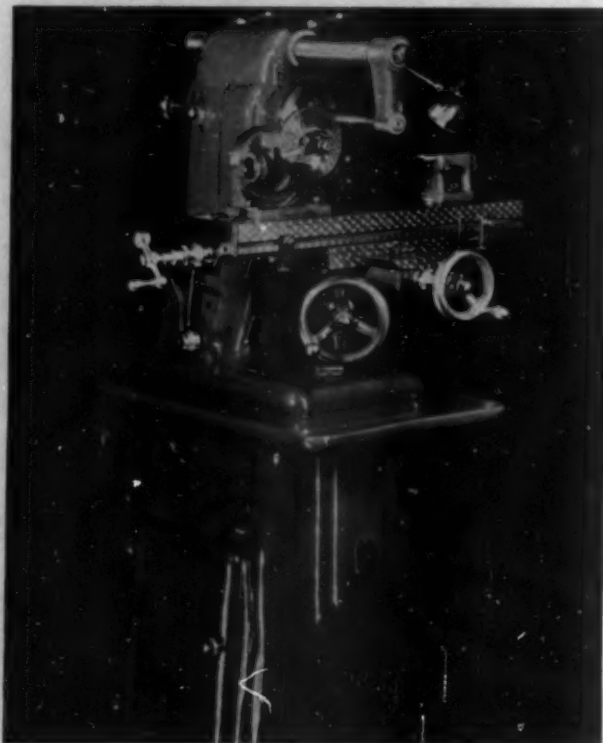


the driver and guides it, the screw goes in straight and sets up much tighter than the ordinary type, making fewer screws necessary. This factor has been found consistently true in the automotive field where this type of screw was used experimentally at first, until all the unique advantages began adding up into cost savings for the manufacturers. They then began using it on difficult screwdriving operations, and gradually applied it where the cash saving soon made itself apparent.

It has been found especially true that time is saved, since the screw stays on the driver once it is put there, and the workman can use his free left hand to hold the work and drive faster. Indeed, a majority of hand driver jobs can be switched to spiral drivers—and many of them are switched from hand drivers to power drivers. Another advantage arises from the fact that the depth and shape of the Phillips recess of the American Plus Screw is a snug fit for the driver—and so does not permit it to slip out. Consequently, there are no bad burrs on the screw head, no scars on the work, and no workmen injured by the driver.

An additional plus value is reported to lie in the screw head—in that its shape allows a mere quarter turn to line it up perfectly with others of its kind. This, it is generally conceded, gives more eye-appeal to the product when the screw head is exposed to view.

THE HARDINGE BB5 PRECISION MILLING MACHINE ILLUSTRATED here is described in a 4-page catalog now available for distribution. It was designed to meet a definite requirement in the tool room and laboratory. Its construction combines ruggedness with accuracy for ease of operation. Eight features are incorporated in the machine; high spindle speeds; compact dimensions, feed screws which revolve in



long adjustable nuts and have friction dials graduated to thousandths of an inch; enclosed headstock with connected bearing design; properly proportioned table, knee and saddle with positive locks and adjustable stops; sturdy table with large working surface; knee section fully enclosed around vertical feed screw bevel gears to exclude dirt and chips; and an enclosed vee belt drive with convenient lever speed control.

THE SHAKEPROOF LOCK WASHER COMPANY HAS RECENTLY announced the development of the new Shakeproof "Hi-Hook" Thread-Cutting Screw, expressly developed for plastic materials.

A specially designed double width slot gives an acute cutting edge that cuts a clean, sharp thread in all types of plastic compositions, both molded and laminated. This construction materially reduces the high driving torque normally encountered and enables fast, easy driving with a minimum of the breakage common to molded plastics.

HERE IS THE ANSWER TO MANY OF YOUR DRILLING AND TAPPING PROBLEMS!



Twelve Delta 14" drill-press heads eliminated an expensive tooling problem for this electric-motor manufacturer.

MULTIPLE DRILLING SETUPS ARE EASY WITH DELTA LOW-COST DRILL PRESSES AND DRILL HEADS

A movie-camera manufacturer uses an eighteen-head straight-line unit to cut costs and eliminate extra handling of work... a carburetor manufacturer uses six bench drills in line, eliminating the need for an expensive six-spindle machine... an automotive manufacturer installs six heads, used horizontally, vertically and at various angles, to drill and tap die-cast radiator grilles... an ignition-parts maker uses twelve standard 17" drill presses, set in U-formation, to cut cost and eliminate two expensive machines... these are only a few of the many ways in which high-production shops are solving their drilling and tapping headaches with Delta drills and drill heads.

DELTA 11", 14" AND 17" DRILL PRESSES

Made in 11", 14" and 17" sizes, drill capacities from No. 60 to $\frac{3}{4}$ ", speed ranges from 385 to 5000 r.p.m., Delta drill presses are adaptable to a wide range of work. All models equipped with New Departure self-sealed ball bearings, requiring no lubrication.

Let us tell you more about Delta Drill presses. Drop us a letter or postcard today.

DELTA MANUFACTURING CO.
641 E. Vienna Avenue Milwaukee, Wisc.



Delta drill presses are low in first cost, but will do all the work of more expensive machines. They require no lubrication, and cost practically nothing for maintenance. They consume little power—from $\frac{1}{4}$ to $\frac{1}{2}$ H.P.—and are highly portable. Delta drill heads can be installed vertically, horizontally, or at any angle. These are some of the reasons why these machines are so popular.

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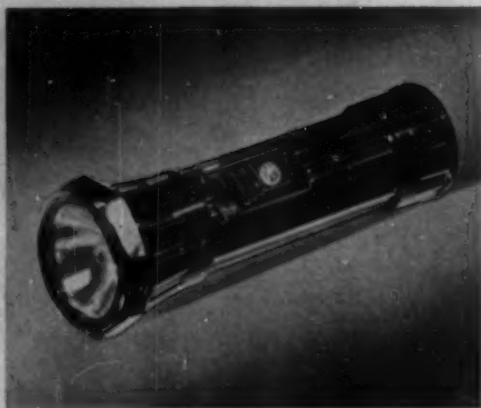
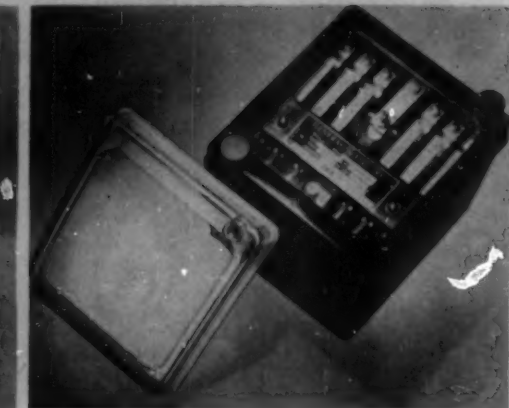
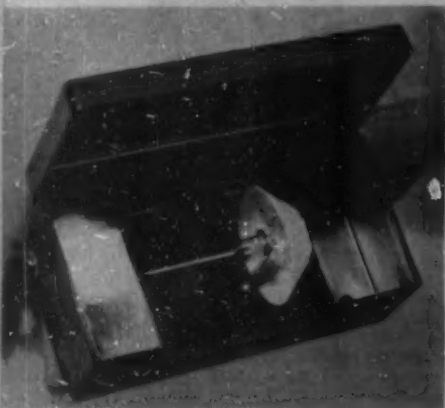
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IN REVIEW



1. Because the reflector is 26 1/2 in. in diameter it is much more convenient to have this exact working replica of the Wakefield reflector for demonstrations. Housed in a Durez case and molded by Kurz-Kasch, Inc.

2. Relay box of Textolite with transparent cover molded by General Electric Co. The cover also shown separately is of Crystalite, a new acrylic molding compound made by Rohm & Haas Corp. A mat finish was molded around the edge of the cover and black paint applied to appear as a frame

3. Salz Bros., Inc., for the first time injection molded this thermometer case of Plastacele for the Taylor Instrument Co. Because of its construction, the glass thermometer is called the Taylor Binoc and can be read much more quickly, it is claimed, than other thermometers

4. Industrial flash-light distributed by the Bright Star Battery Co. is entirely molded of Lumarith and features a red translucent lens ring which glows when the lamp is in use. The unbreakable lens is also molded

5. A high safety factor has been incorporated in a Phasetector through the use of Synthane insulation. The instrument is used for detecting potential and indicating phases, particularly in underground systems. Manufactured for the Railway and Industrial Engineering Co.

6. This metal chair with Lucite seat and back designed by Aaron Wallance of the product design class of the Design Laboratory, is the result of a competition sponsored by the Museum of Modern Art. The chair is light in weight, compact, portable and easily stacked in a vertical pile

7. Economies have been effected through the use of plastics in this Sessions wall clock by eliminating the use of insulating parts; because molded holes and self-tapping screws eliminated several operations; because the bezel is molded open as a part of the clock case. Designed by Frederick E. Greene. Molded by Jos. Stokes Rubber Co.

8. Clinton radio housing molded in three separate parts of Beetle and Plaskon by Auburn Button Wks., Inc., which permit unusual decorative effects. By Olsen Designers

Manufacturers' addresses will be sent if you will write to the Editor, enclosing 3-cent stamp for reply

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about Design... Specifications... Costs... Service!

You'll fall right in the class with many, not all, but many buyers of plastics when they first said, "Let's try Stokes!" (The first buyer, incidentally, came to us over 41 years ago.)

But we believe you'll soften up considerably when you find that STOKES has:

..... A designing staff well known for modern, practical designs that sell merchandise;

..... Ample molding and maintenance equipment, much of it in duplicate and triplicate to insure unexcelled service;



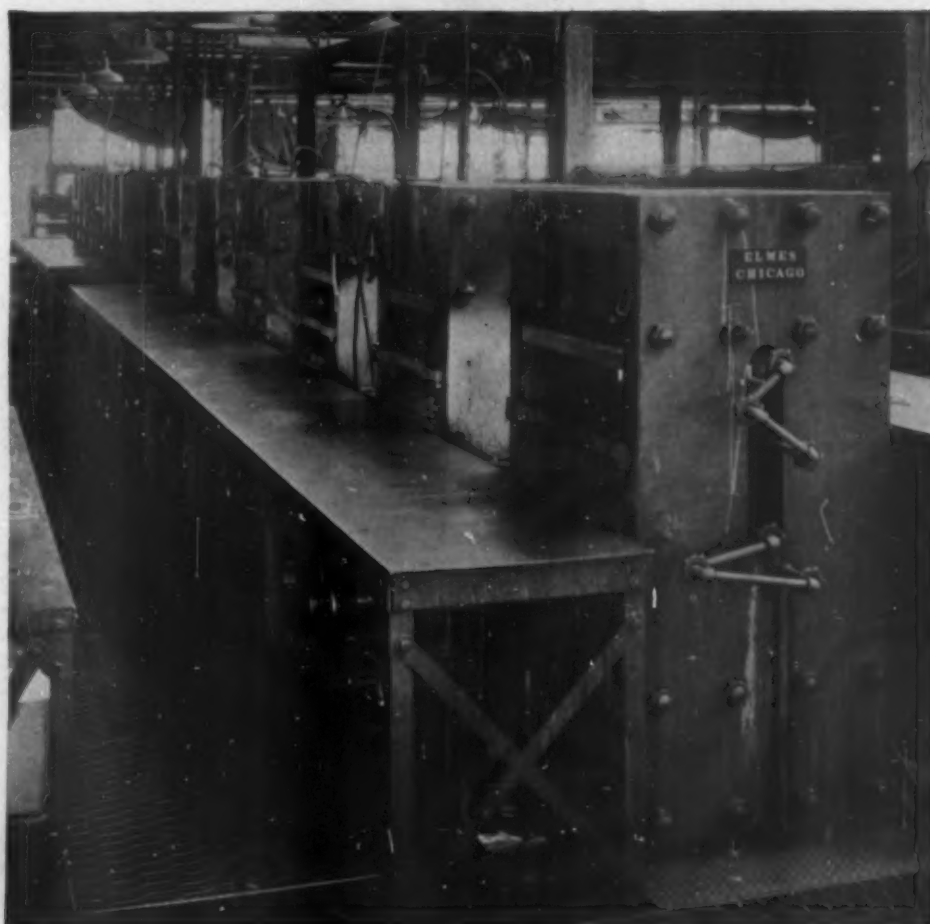
..... A strategic location in the center of industrial activity, and convenient to our sources of raw materials which effect definite economies;

..... And every form of transportation at our disposal—air, rail, water, and truck connections to any point in the country.

If there are any wrinkles in this business of molding that are bothering you, it won't obligate you in the least to ascertain whether or not STOKES can iron them out to your satisfaction.

J O S E P H **STOKES** RUBBER CO.

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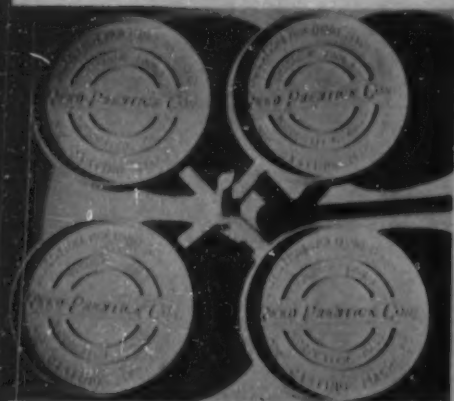
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SATISFACTORY AND
CONTINUOUS DAILY
OPERATION SINCE THE
INSTALLATION.

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IN REVIEW



9



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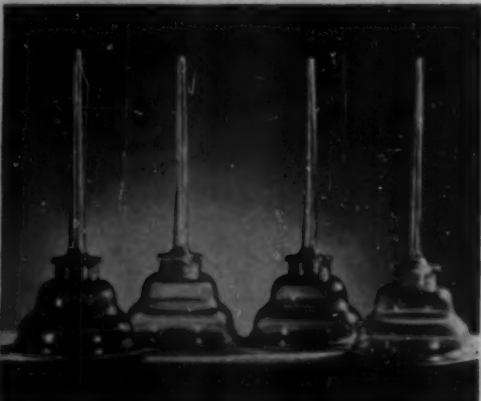
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12



13



14



15



16

9. Injection molded coasters just as they come from the mold. 7 3/8 in. overall diagonal dimension. Molded on a Reed-Prentice injection press in a mold made by Guy P. Harvey & Son

10. Master cigaret holder molded of Durez by Northern Industrial Chemical Co., Inc., for the Gordon Mfg. Co. It is molded in two sections and uses an extra cigaret within as a filter and cooler. Decorative metal rings encircling the holder are molded in

11. Two Way Tooth Brush is injection molded by Erie Resistor Corp. for the Noo Tooth Brush Co. The brush handle is molded flat and later formed into the half oval shape after the bristles are inserted. It is designed to clean the teeth and to massage the gums all in one stroke

12. Both parts of the Jackey hair waver are injection molded of Tenite in one mold at the same time, by Elmer E. Mills Corporation. The side openings and close tolerances of fitted parts make this a complicated piece to mold

13. The Vitalis Seal tube display stand is molded of Durez and Resinox by Plastic Products, Inc. The bottom is grooved to hold the tubes vertically in place and small stud-like projections which replace closures fit into openings at the top of the stand

14. Transparent oil cans in crystal, red, blue and green show the content clearly at all times. Even the spout is molded, but the base is copper. Available from Universal Plastics Corporation

15. A miniature Bakelite barrel is attached to the bottle neck of Crab Orchard Old Kentucky Whiskey. It serves to rip the seal when the bottle is to be opened. Molded by T. F. Butterfield, Inc., for National Distillers Products Corp.

16. Calvert Distilling Co. introduces novelty pouring tops, molded of Plaskon in the form of cats, dogs, roosters and ducks. They facilitate rapid pouring and eliminate removing the cork each time a drink is poured. Molded by Universal Plastics Corp. for Dalynip Pourer Corp.

Manufacturers' addresses will be sent if you will write to the Editor, enclosing 3-cent stamp for reply



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in two halves for Hobart
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KURZ-KASCH WILL MEET YOUR REQUIREMENT

Name any plastic requirement and Kurz-Kasch is equipped to meet it. Large runs, deep draws, difficult shapes . . . Kurz-Kasch has the facilities and the skilled workmen necessary to handle them all.

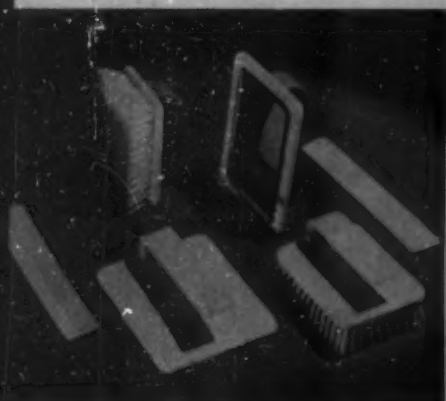
This pioneer company is also headquarters for molds as well as moldings. One large department specializes in their design and construction. But should you be able to use any of the large stock of molds always on hand, such can be furnished without charge.

Keep Kurz-Kasch in mind when that next plastic job comes up. Remember . . . Kurz-Kasch, for everything in plastics, out of any of the preferred materials. Kurz-Kasch, Inc., Dayton, Ohio.

Branch Sales Offices: New York, Chicago, Cleveland, Detroit, Los Angeles, Dallas, St. Louis.

KURZ-KASCH Inc.

IN REVIEW



17



18

17. A modern version of dresserware in which the mirror is designed to stand alone for convenient use. Available in the usual Amerith colors from the Celluloid Corp.

18. The Corona adding machine has a Durez housing molded in one piece by Diarmolding Corp. Light reflection, it is claimed, is less than on the former baked enamel finishes



19



20

19. To increase gift appeal of safety razor blades, the Gillette Safety Razor Co. has packaged them in Bakelite molded ash trays. Ten packages of five blades conveniently fit into the bowl of the tray which afterward can be used on a smoker's table. Molded by Northern Industrial Chemical Co.

20. Eveready vest-pocket flash-light with aluminum case. The bulb is designed to throw a sharp spot beam straight ahead, while the Tenite lens injection molded by National Carbon Co. throws a diffused spread of light as well



21



22

21. Crest line of kitchen utilities of the Edward Katzinger Co. features molded Durez handles in green and red which are two most desired kitchen colors. More than 20 pieces are included in this line

22. Amateur photographers can develop their own enlargements with Bakelite trays molded by The Insulation Mfg. Co. The trays are heavily constructed to withstand considerable abuse and are unaffected by the corrosive action of developing chemicals

23. Emerson Radio & Phonograph Co. recently added to their line this new cabinet molded of Beetle by Associated Attleboro Manufacturers, Inc.



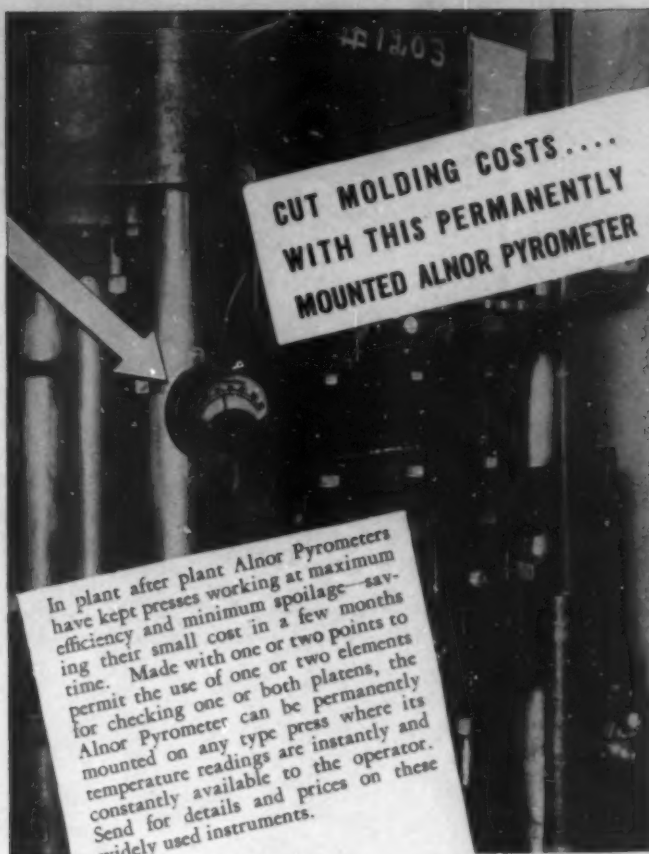
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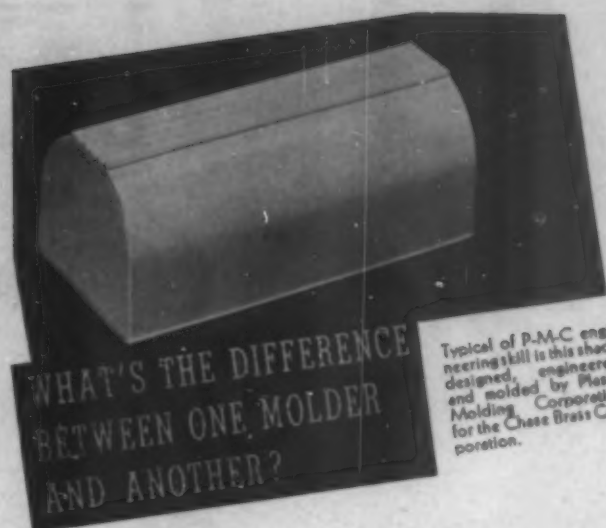
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24. Cleansing pads in air-tight containers, compact-size, for purse and dressing table jars, are 2 in. in diameter and saturated with cleansing lotion. Covers and bases of Plaskon and Durez are interchangeable for contrasting color combinations molded by Colt's Patent Fire Arms Mfg. Co. and Norton Laboratories, Inc.

Manufacturers' addresses will be sent if you will write to the Editor, enclosing 3-cent stamp for reply



ILLINOIS TESTING LABORATORIES, Inc.
428 N. La Salle St. Chicago, Ill.



There are many good molders. And the purchaser of molded parts or products may logically ask whether it makes any difference who does the molding. For your guidance, here are some outstanding facts about the Plastic Molding Corporation.

P.M.C. engineers have 18 years of direct molding experience behind them.

P.M.C. owns a completely integrated plant . . . able to perform every molding and mold-planning operation under a single roof and a single control.

P.M.C. can refer you to half a gross of clients—in almost every line of industry—who have found its prices right, its molding perfect, its inspections rigorous and its promises performed or exceeded.

We invite your further inquiries

PLASTIC MOLDING CORPORATION
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The most modern molding press will be inefficient

UNLESS . . .

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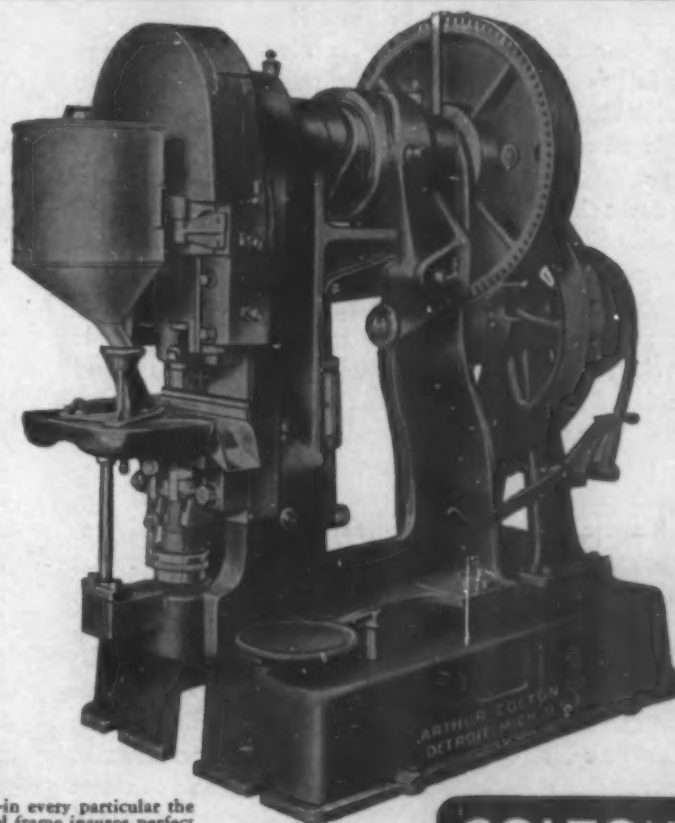
Colton Preforming Machines are the accepted standard in the plastics industry not only because they speed up the molding cycle but because their unvarying accuracy of performance is a guarantee of better molding at the press. When Colton preform-pellets are used material waste is eliminated, flash is held to the ideal minimum, material handling problems are simplified and costs d

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The new improved $3\frac{1}{4}$ tablet machine—in every particular the finest the market has to offer. Solid steel frame insures perfect operation; improved die fasteners, improved cam construction, heavier ejecting mechanism, vanadium steel plungers—make high speeds possible without fear of breakdown or lowered quality. Makes tablets up to 3" in dia. having a fill depth up to $2\frac{1}{4}$ ".



**COLTON
DETROIT**



Observation car has photomurals of New York and Chicago on heavily woven cloth at either end shielding radio loudspeakers. Conveniently arranged tables have Formica tops. Window sills throughout the train are of this same laminated material. Both ends of the observation lounge are pictured above. (Photos by Drix Duryea)

TWENTIETH CENTURY LIMITED

(Continued from page 23) gether. Magazine racks are built into the ends of the settees, and a writing desk, circular tables and several arm chairs are conveniently placed. The color scheme is rust and gray with walls of brown cork and copper trim. At one end of the lounge is a fully equipped service bar with transparent plastic display shelves. "We used this plastic material instead of glass because the shelves had to be cut into strange shapes." Copper light channels continue from the ceiling down the wall behind the bar. This car also shelters an octagonal shaped barber shop, the corners serving as closets and cupboards, in rust, gray and white.

"In the diner we once again have an entirely new seating arrangement. There are single tables for people traveling alone and as many as five people can be seated at other tables. Usually in dining cars, when seating a party of five, one person has to sit alone or at another table and this we have overcome."

In the center of each dining car is a main dining section, with a smaller room at either end, and kitchen and pantry at one end. In the main dining section, tables are set before curved settees in diagonally opposite corners. An individual table is placed next to this corner table and may be used in conjunction with it. Benches facing the length of the diner are in the other two corners. Some tables are placed side by side, facing into the diner, while others face each other. This varied arrangement breaks the traditional, long, narrow aisle and gives an intimate feeling to the car. The walls of the main section are of gray leather with windowed mirror posts. Benches of gray leather, match the walls in color, but are of different texture. Rust leather chairs complete the furnishings.

The end dining rooms, which are small and cozy, have walnut walls, rust colored ceilings and gray leather chairs. The carpet throughout the dining cars is in three shades of rust. The two end sections are divided from the main section by partitions made of transparent plastic. Into the end of one of the small dining sections have been built two quarter circular cabinets, the upper parts of which are partially enclosed with glass, illuminated and banked with fresh flowering plants. The walnut veneered lower portions house a linen closet and a cabinet housing a radio and phonograph. One end wall of each dining car is of glass so that when two cars are used together, diners may look from one into the other giving the impression of spaciousness and length. When only one dining car is used, mirrors may be pulled up to cover these transparent partitions.

"It is planned to have classical music during dining hours and lighter music during the evening. The Century always trundles along a couple of dining cars to Chicago and always after eight o'clock nobody sits in them. We have special wiring in the new diners and after dinner has been served, the regular bright lights are turned off and an auxiliary system of lights turned on, illuminating the car with soft rose light. Different linens are put on the tables and the room takes on the aspect of a cafe, and it is felt that people will use the rooms during the evening for card playing and chatter. We have done everything we could to make all cars seem wider. A train is always long and narrow and we tried to make it look as wide in proportion as possible."

The observation car, in its main lounge section, has blue leather built-in settees on each side and is carpeted in gray. The settees face toward the windows leaving a spacious center aisle. They are separated by narrow gun



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- Setups and adjustments quickly made.
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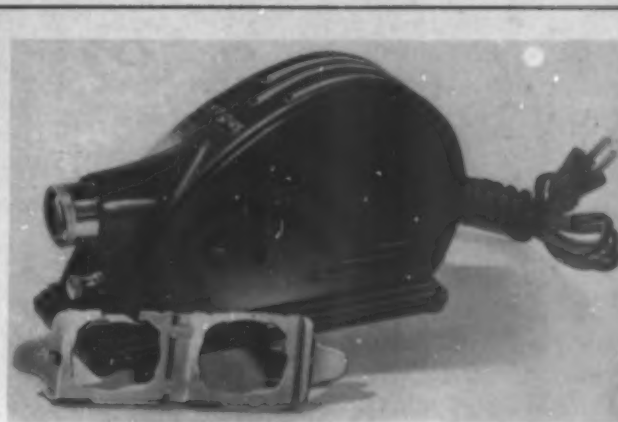
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molded of Bakelite for the International Research Corp., Ann Arbor, Mich., is another excellent application of Plastics in the photographic field.

THE ARGUS PROJECTOR enables the Candid Camera enthusiast an opportunity of viewing his picture in enlarged proportions.

It is economical to own and operate and being molded of Plastics is light, strong and attractive in appearance.

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2146 Walnut St. Chicago, Ill.



GORTON DUPLICATORS

and

HOOVER CLEANING ENSEMBLES

The Hoover bag ring, a part getting much handling, is made of plastic from molds now produced on Gorton Duplicators at large savings. The 9 cavity mould used to take 504 hours. The Duplicator makes it in 120 hours, 76% less. One cavity tooled out in 56 hours, is used as a master for reproducing 8 cavities in 8 hours each.

GEORGE GORTON MACHINE CO
1100 13th ST. RACINE WIS.

metal columns reaching to the top of the car, affording privacy for small groups. Walnut tables for magazines and specially designed lighting fixtures are built in at intervals between the settees. The side walls are of gray leather.

"At each end of this car we have put photomurals done on heavily woven cloth, and to the best of our knowledge this is the first time such a thing has been done. These are really photographic tapestries. At one end of the car is a view of Chicago and at the other, a view of New York. Music comes from behind the photomurals from a radio loudspeaker placed there."

Below each mural is a built-in curved settee, a table and two pigskin chairs. The observation end of the car has two semi-circular settees facing out, giving an unobstructed view of the scenic panorama. Around the small tables are movable arm chairs and in the wall which separates this end of the car from the main lounge, is a built-in settee.

In the forward end of the observation car is a large deluxe suite, consisting of a spacious drawing room and a bedroom, decorated in harmonious shades of rust and pigskin gray. These two rooms may be thrown into one by means of a folding wall. Each contains complete lounging and toilet facilities, including, in the case of the drawing room, a shower. There is also a small radio for private use of the occupants.

"In two of the observation cars we have maps showing the route of the Century, and inset in the bulkhead on each observation car compartment is a speedometer and odometer showing how fast the train is going and how far it has gone from the point of departure. In other observation cars we have scale models of the new streamlined Hudson type locomotive which draws the new Century." These are in cases recessed into the walls.

In the semi-circular vestibule of the lounge car are two cases, recessed into the wall at each side of the door. In one is a scale model of the DeWitt Clinton, the first train operated in New York State, in 1831; in the other is a model of the famous 999 locomotive which on May 10, 1893 set a new world record for speed of 112.5 miles per hour on the New York Central near Batavia, N. Y.

"We have studied the situation of lighting very thoroughly. We have a lens lamp over almost every seat in the place which will give better reading light on the trains. We have worked out an insignia for the train which is used on china, glassware, silverware, wine lists, menus, match covers, ash trays, magazine covers, writing paper, loaf sugar wrappers, and even on the tickets for the train. When we do this sort of job we do every least detail connected with it as well as the bigger undertakings of exterior and interior. All fabrics were specially woven and dyed for the job. All china, glass and silver is custom built. To break the monotony of long aisles, we have had drawings of old New York Central engines framed and hung on the walls.

"The new Century train is designed and built for sociability. People can get together in friendly groups or they can travel alone and still like it. Every car is well lighted and air-conditioned. Telephones are handy for

calling the dining car to reserve tables or for any other purpose. When you ring for the porter, a gong sounds so there aren't a lot of buzzes going on all over the train.

"It seems to me that what happened with the Mercury (designed for New York Central by Mr. Dreyfuss two years ago) will be true of the new Century. People make appointments to meet on the train just as they would at a club or cafe. The convivial hospitality, the luxurious refinements, the restful atmosphere make the Century indeed a Club on Wheels—and the ride to Chicago, a pleasant and restful journey."

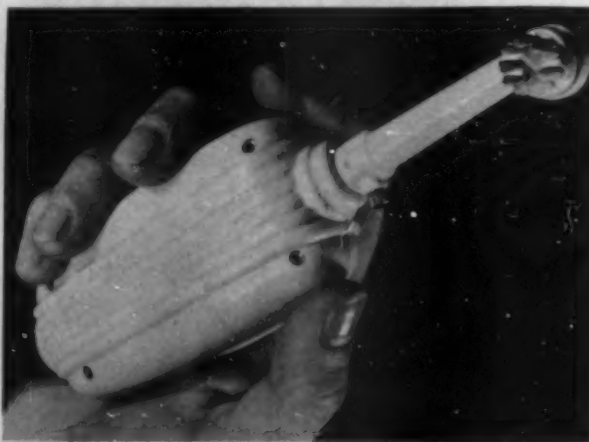
Only trouble is, the laminated plastics used on table tops, bar top and sills throughout the train will probably last too long.

HOUSING MIDGET MOTORS

(Continued from page 27) an electric motor would certainly meet tremendous sales resistance if motor operation were not held to a mild humming. Plastics are naturally non-resonant. They aid materially in deadening the steady buzz of the motor. No extra sound deadeners or reverberation cushioners are needed. So, from that angle plastics help to beat down sales resistance.

Bearing alignment is vital to the continuous service of this type unit. The use of plastics simplifies this problem, too. Bearing supports can be molded in the housings within an accuracy of .002 of an inch. Such close tolerances make bearing alignment adjustment very simple. It is quite possible that with this limitation of

Unusual engineering technique is required for Motodent, an electric tooth-brush, as well as for the Zephyr razor housing which is also illustrated



bearing adjustment no reaming or milling would be necessary for the bearing holder, thereby decreasing manufacturing costs.

Which brings us to the matter of assembly. Here is where any other material than plastics would mean an assembly cost far too great to make the item available to the average pocket. Use of plastics permits the use of screw machine parts for inserts, mounting lugs, etc. These can be molded right into the case making assembly a comparatively simple job. This means elimination of jigs and fixtures, extra handling, extra assembly time. As for finish, that's an old story with most of you. Removal of flash and a cleaning buffing makes the plastic case ready to wear forever. Smooth, lustrous, pleasant to handle and it can't wear off. No baking or japanning—no touching up or peeling off—no extra handling.

Unquestionably plastics have helped the midget motor manufacturer to sales. In return these manufacturers have extended their research greatly and improved motors. Increased sales usually mean increased research. Increased research generally results in increased sales. And we're on the merry-go-round of business. Isn't that what's really happened to this profitable combine of plastics with midget motors? Although neither draws its life blood from the other they make excellent teammates and bigger business for both has resulted.

FURNITURE FROM FRANCE

(Continued from page 26) in contrast with red cushions as used, for instance, in the well known Paris night club, *Le Boeuf Sur Le Toit*.

"We started molding these table tops," Mr. Forrer goes on to say, "in 1932 and they have proven an outstanding success. The only drawback, from the molder's point of view, is that the molding of such thick parts needs correspondingly big and expensive molds as well as big presses. Our 100 by 600 millimeter table tops are molded on 1500-ton presses."

Cafes in the United States have made considerable use of laminated phenolics for tables and bar tops, as well as for bar fronts and wall decorations, but there still re-

Molded table tops and chair backs are extensively used in French cafes



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At Auburn Button Works none of these sales influencing points are overlooked. Into every plastic container or package molded here goes the design experience, the creative artistry and the knowledge of the psychological factors that make sales that have been acquired through 62 years of pioneering molding experience.

If you are planning a new package, by all means consult an Auburn engineer. There is no obligation.

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mains an opportunity for some manufacturer of this type of furniture to provide American restaurateurs with the added advantages of molded table tops, as well as chair backs and arms. With the two approaching national expositions in this country, the New York World's Fair 1939, and the 1939 Golden Gate Exposition, it would seem that some manufacturer would get into production to fill the demands of a ready-made market.

School furniture is another item which offers a continuous year round market for a product with the sanitary advantages of a plastic surface on both desks and chairs. These are extensively used in France, and it is surprising indeed to find the lack of initiative among American manufacturers necessary to inaugurate a manufacturing plan to provide such furniture.

ADHESION IN WOOD PLASTICS

(Continued from page 40) cal considerations. The slight additional effectiveness beyond this threshold value of pressure is doubtless due merely to bringing a greater number of micelles within the attractive field of surface tension, i.e., reducing the micellar area not in contact with other micelles. It follows, also, that the rigidity of the micelles themselves, resisting deformation and its accompanying surface contact and attraction, would limit the upper effective extent of externally applied pressure.

Coincident to cellulose bonding, mechanical subdivision by beating would enormously increase the external cellulose surface and potential bonding capacity. Similarly, gelatinization by either mechanical or chemical means should contribute greatly to higher strength, as demonstrated by a recent advance in wood plastics by hydrolyzing the cellulosic material before pressing (1). Also, additional adhesive material would result from the hydrolysis of cellulose and hemicelluloses should elevated temperatures be employed in pressing.

In conclusion, the attempt to develop the bonding capacity of cellulose both by mechanical comminution and by chemical gelatinization would appear to be extremely productive of higher strength, while the lignin in simple state would require definite chemical reaction before its adhesive properties become of major importance.

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(Editor's note: I. W. Bailey in an article entitled "Cell Wall Structure of Higher Plants" published in *Industrial and Engineering Chemistry*, vol. 30, pages 40-7, January 1938, has shown that in heavily liquefied cells either the lignin or the

cellulose may be dissolved without seriously modifying the continuity or the structural pattern of the remaining system. Also, in connection with the development of wood plastics, it should be emphasized that the presence of resinified lignin or other resinous material is of major importance in the development of resistance to moisture.)

TO SEE OR NOT TO SEE

(Continued from page 25) metal hinges to which the temples or side pieces are attached. Oxfords, of course, do not have temples but whether folding or non-folding, they must be carefully prepared for the spring attachment upon which they depend for their successful grip.

Making the temples is equally important. Many optical frames are made with reinforced wire-core temples which facilitate their adjustment and increase their strength. They are made of two strips of zylonite which have been cored sufficiently to permit the wire core to be placed between them. Both grooved surfaces of the strips are covered with a solvent cement and when assembled they are joined by controlled and sustained pressure over a long period of time. The cement being a solvent of the zylonite causes the two strips to fuse into a solid piece. The wire-cored temples are then submitted to the same processes of washing, sandpapering, frazing and carving as the front of the frame. With all parts of the frame assembled, it is ready to go to the optical dispenser who will fit the frames with glasses according to individual need.

Up to this point zylonite spectacle frames are intrinsically stock items but because of their flexible nature, opticians can by re-heating readily adjust them to exact contours of the nose bridge for perfect comfort and fit. Temples, too, may be lengthened or shortened to the individual requirements. The metal cored temples may be bent at will yet will hold their shape over long periods of time. That is why we said a short time before that zylonite frames are *practically made on the face*.

We have heard quite a good deal lately about the returning popularity of these spectacles. That Fashion has decreed them as smart. Retail sales indicate this to be so. Fact is, they have always been *smart*, and infinitely more *comfortable* to wear than any other type of spectacle ever introduced. Sun glasses, which are generally injection molded of cellulose acetate plastic, have been so broadly accepted during the past few years that people who have become accustomed to wearing this comfortable type of spectacle, will have no other.

Colors, too, have added to their popularity. In the beginning there was little choice beyond the "tortoise shell" and black. Now, there are pink crystal, clear transparent, and two-toned effects, achieved by laminating black or red with crystal colors or clear. There are "blond" as well as "brunette" affinities. Smart style demands a variety of shapes and effects and alert designers with the aid of versatile plastics have been able to provide them. The choice now is almost unlimited. There are models that conform closely to the contour of

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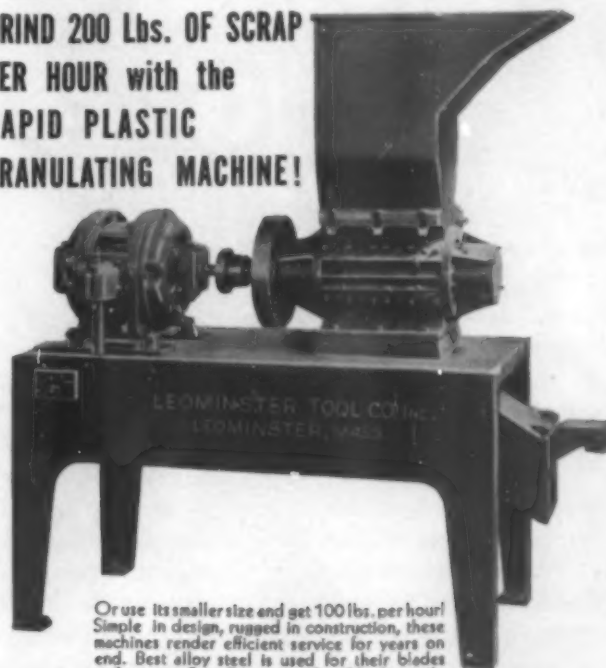


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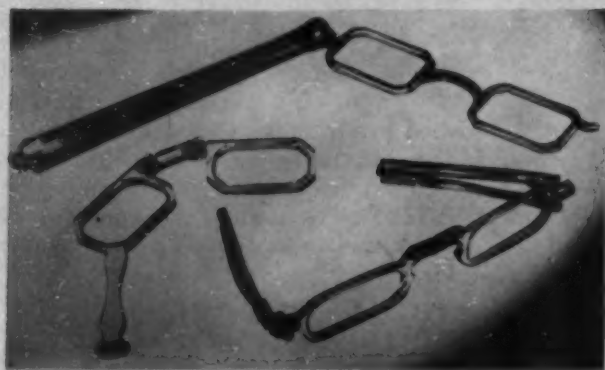
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1. Some of the new transparent pink and "crystal" Celluloid frames of ultra-modern design. 2. Folding colonials and lorgnette. 3. Sun glasses of fashionable contour. (Courtesy Celluloid Corp. and Optical Products Co.)

the face, there are models that fold into practically nothing for handbags, models with straight temples that lessen the hair mussing problem of business women, models that are octagonal, round, oblong or asymmetric. Folding lorgnettes are "at home" with the Four Hundred.

Women find that spectacles can express the occasion as well as clothes. Some leaders of fashion keep a small wardrobe of glasses to add to their personal charm. It is not surprising now to see women wearing large round frames for the serious work of life, twirling an oblong pair of colonials over cocktails, gesturing with a lorgnette at theater, with maybe a folding oxford as a spare just to provide a change in facial expression.

Men, too, like zylonite frames and find an equal choice of mannish shapes and colors to suit their personalities on varied occasions. Men, though, are more likely to prefer zylonite because it is exceedingly practical as spectacle material. The plastic rims surrounding and supporting the lenses serve as a protection against lens breakage caused by dropping or knocking against desks or tables. More than this, they rest easily over the

nose and ears, do not leave marks or abrasions which commonly identify the use of irritating spectacles.

Those who do not find it necessary to wear glasses all the time, just to slip them on and off when close work requires, find zylonite frames more convenient than any other type. They carry well in the pocket, hold their shape. This doesn't mean that zylonite optical frames will supplant all others. Not at all. Many still prefer rimless, and other kinds of spectacle frames. It does mean however, that in this age of plastics, with improved colors, more distinguished shapes, neither retailers nor manufacturers can ignore an increasing demand.

Plastics of a different sort, acrylic resins to be specific, have already made much progress in replacing glass as lens material. Such lenses will withstand much greater shock than glass without breaking. They scratch easily however, at the present stage of their development and this is their greatest handicap. Steps are being taken to overcome this difficulty and when it is satisfactorily accomplished, plastic lenses will more than likely become widely used. The fact that they will not shatter, or splinter if fractured, makes them far safer for every optical purpose, especially when worn in connection with sports.

When plastic lenses are combined with plastic frames with a suitable solvent cement, they become a homogeneous unit. Lenses cannot drop out or turn around. Such construction is not of the present day however, but of the future. In the meantime, zylonite frames have returned to popularity and are likely to remain the fashionable spectacle for some time to come.

PHENOLICS IN GRAPHIC ARTS

(Continued from page 31) give satisfactory results when properly controlled.

Additional equipment would consist of a tinsmith's foot shears, Fig. 2, for cutting up the matrix sheet and trimming the rubber plates, a good gauge, Fig. 3, for accurately measuring the thickness of the matrices and plates and an assortment of bearers and shims for controlling their thicknesses.

The molding technique is simple. The first step, of course, is to make the matrix. This consists briefly in laying a piece of matrix sheet over the original "pattern" plate and pressing it for approximately ten minutes between the heated platens of the hydraulic press. The original or "pattern" may be either a type form, a zinc line cut, an electrotpe or copper halftone. All plate originals are removed from their wood blocks before the molding is done.

The depth of the matrix is controlled by the use of parallel bearers—consisting of thin steel bars or strips—along either side of the original pattern plate. By superimposing one bearer upon another any desired depth or "floor" thickness can be obtained. Fig. 4 illustrates a typical bearer assembly for type matter. The type form is shown on the press platform with the bearers on either side set for a matrix "floor" thickness of .135 in. To

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Molding this pen tip of transparent Lucite, a black bushing was needed to hide the anchor of the nib. Originally we molded the bushing inside the tip—but found that unsatisfactory—and so devised the present method of molding it on the *outside*, which proved a far better way of doing it.

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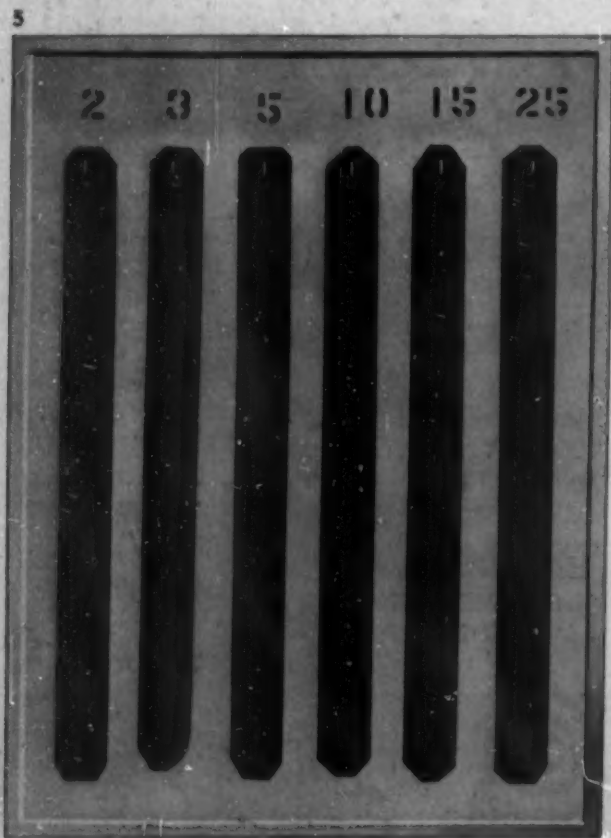
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this, of course, is added the height of the type (.918 in.) giving a total bearer height of 1.043 in. The bearer thickness, of course, is changed to suit the different thicknesses of the various pattern or "master" plates, but the principle is the same in each case.

Essentially the same technique is followed in molding the rubber plates. Matrix thicknesses will necessarily vary one from another owing to the varying displacements due to corresponding differences in the relief areas of the "master" plates. Greater care is therefore necessary in building up the bearer assembly so as to insure a plate thickness of the closest possible uniformity. Here the practice is to "mike" the matrix "floor" then add to it the desired thickness of the rubber plate plus an allowance of approximately .010 in. for rubber shrinkage. Bearers must frequently be built up within two- to three-thousandths of an inch. To provide for these ad-



justments thin steel shims, Fig. 5, varying from .002 in. to .025 in. are an essential part of every plate molder's equipment. The close tolerances demanded of metal plates are not so essential for rubber printing. Rubber plates may vary as much as .002 in. to .003 in. in thickness and still do a very satisfactory printing job due to their compressibility.

A word ought to be said here in recognition of the contribution made by the rubber manufacturers in the improvement of rubber stocks for printing plate purposes. Very real progress has been made in this respect within the last few years so that the earlier criticisms of rubber on the score of its susceptibility to oil inks and driers, its excessive shrinkage and "cussedness" in molding, have largely been overcome and it is now beginning to receive serious attention in the printing world. In point of fact, rubber plates are being successfully used today in many large printing establishments throughout the country.

Rubber plates take less ink and lay ink better on the paper than metal plates. They require less make-ready and will do excellent printing on practically every kind of paper, parchment and fabric. For cellophane or glassine stocks they are unexcelled. And their printing life is equally good. Runs of 200,000 to 300,000 are not unusual with oil inks while with aniline impressions of 800,000 to upward of 1,000,000 are quite common.

On the other hand, little if anything has been done with rubber plates in "process" color printing, nor has rubber yet been used to any appreciable extent on fine monotone screen work, although some interesting examples have been shown in the lower screen ranges. But in general the halftone dot still presents a problem for the rubber plate manufacturer because of its tendency to spread or "mushroom" in printing. There is, however, much good "solid" color printing being done on bread wrappers, butter parchment, cellophane and glassine bags, envelopes and other types of colored circulars.

I believe it to be true that most of the spade work has now been done in demonstrating the value of rubber as a practical and efficient medium for letterpress printing. There have been many contributors to this spade work but I feel that particular acknowledgment should be made to the Jas. H. Matthews & Co., Inc., for their courageous pioneer work in this field in the days when it was an uphill fight indeed, also to H. H. Heinrich not only for his enthusiastic advocacy of rubber plates but also for his enterprise in providing modern equipment for making them and good presses on which to print them.

The chief need now is the development of improved methods for registering and mounting the plates so as to reduce press "down time" to the minimum. This development, I am pleased to say, is well along so that within the next few months—coupled with a change of cylinders in the present rotary presses—it will be possible to mount a master plate containing any given number of plate units on press cylinders as quickly and efficiently as is now done in offset printing. With this accomplished "soft surface printing" is destined to make a very important place for itself in the graphic arts.

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